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VOL. 48 MARCH, 1922 No. 229

United States Naval Institute

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CONTENTS

	PAGE
The Future of the Submarine in International Law.—Cooper	337
Military Conservatism.—Sims	347
Under Which Government Department Do Shore Radio Stations Belong?—Hooper	365
The South American Alsace-Lorraine.—Creighton	377
The Vital Importance of Radio Communication in Modern Naval Warfare.—Breckel	383
Relativity.—Lyle	395
Principles of Command.—Chandler	403
We, the People, and the Treaty Powers of Our Government.—Fisher	423
Discussion	439
Secretary's Notes	447
Professional Notes	455
Notes on International Affairs	507
Information Index	449

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Published monthly by the U. S. Naval Institute, at 450 Ahnaip St., Menasha, Wis.

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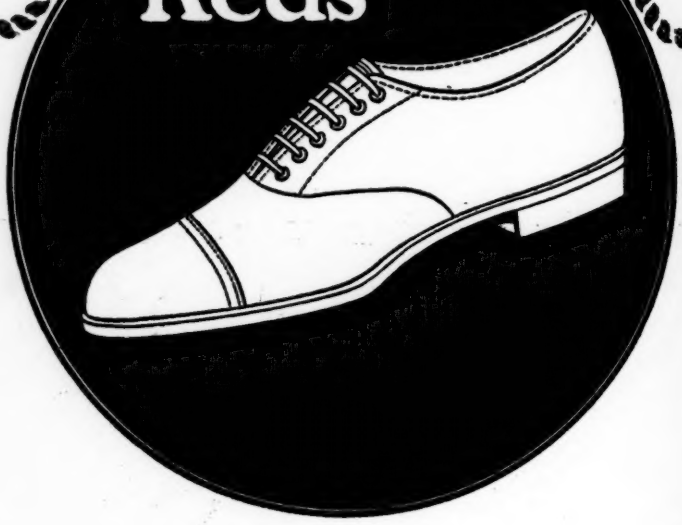

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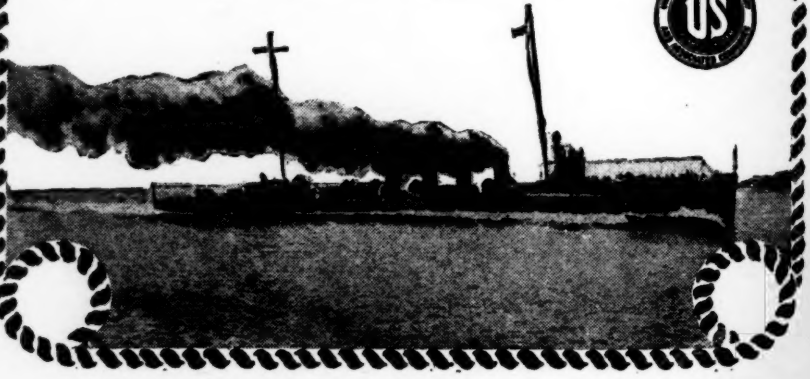

Vol. 48, No. 3 March, 1922 Whole No. 229

United States Naval Institute

Proceedings

PUBLISHED MONTHLY
EDITED BY F. M. ROBINSON

U. S. NAVAL INSTITUTE
ANNAPOLIS — MARYLAND

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The Collegiate Press
GEORGE BANTA PUBLISHING CO.
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CONTENTS

THE FUTURE OF THE SUBMARINE IN INTERNATIONAL LAW. By Morris Cooper, Jr., of the New York Bar 337

MILITARY CONSERVATISM. By Rear Admiral Wm. S. Sims, U. S. Navy 347

UNDER WHICH GOVERNMENT DEPARTMENT DO SHORE RADIO STATIONS BELONG? By Commodore S. C. Hooper, U. S. Navy 365

THE SOUTH AMERICAN ALSACE-LORRAINE. By Lieutenant J. M. Creighton, U. S. Navy 377

THE VITAL IMPORTANCE OF RADIO COMMUNICATION IN MODERN NAVAL WARFARE. By Lieutenant Harry F. Breckel, U. S. N. R. F. 2 383

RELATIVITY. By Lieutenant H. K. Lyle, U. S. Navy 395

PRINCIPLES OF COMMAND. By Rear Admiral Lloyd H. Chandler, U. S. Navy 403

WE, THE PEOPLE, AND THE TREATY POWERS OF OUR GOVERNMENT. By Commander J. O. Fisher, U. S. Navy 423

DISCUSSION 439

SECRETARY'S NOTES 447

BALANCE SHEET 451

PROFESSIONAL NOTES 455

NOTES ON INTERNATIONAL AFFAIRS 507

INFORMATION INDEX 449

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DESTROYERS AT BALBOA

UNITED STATES NAVAL INSTITUTE PROCEEDINGS

Vol. No. 48, No. 3 **MARCH, 1922** **Whole No. 229**

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE FUTURE OF THE SUBMARINE IN INTERNATIONAL LAW

By Morris Cooper, Jr.
of the New York Bar

The most active source of change in the rules of warfare has always been the invention of new mechanisms, new engines of destruction.

Such mechanisms, when unusual, have always been surveyed with apprehension, and, in fact, it has at times been considered a violation of the rules of military etiquette and honor, to use them. Conflans, the French vice-admiral, issued an order of the day on November 8, 1759, forbidding the use of hollow shot against the enemy, on the ground that they were not generally used by polite nations, and that the French ought to fight according to the rules of honor. The same view was taken of the use of hot shot, grape, chain-shot, split balls, etc.[1] The attitude of the Chinese swordsmen toward the introduction of gunpowder in the sixth century was undoubtedly similar.[2]

The novelty of the submarine as used by Germany in the Great War lay not in its employment against war vessels, but against merchant shipping. Before 1914 such an application of

[1] Halleck—*International Law*, N. Y. 1861, p. 398
[2] Wells—*Outline of History*, p. 556.

Destroyers at Balboa

undersea boats, while it may have been in the minds of naval experts, had certainly never occurred to the layman. The theory expressed in the words *spurlos versenkt* was unborn.

Before the Great War the rights of belligerent and neutral merchant vessels were fairly clear. It was the duty of such vessels, if duly signalled, to lie to, and submit to visit and search. Refusal to do so was at the risk of the vessel. Capture of a belligerent merchant vessel was followed by removal to port, and an adjudication there by a prize court. To this there were certain exceptions. Under certain circumstances, such as the dangerous condition of the prize, the possibility that if released it might aid the enemy, the inability of the captor to furnish a prize crew, the distance from a national port of the captor, lack of supplies or the presence of disease, the prize might be sold or destroyed forthwith.[3] The crew, and the ship's papers must, however, be first removed to a place of safety so that there might be a prize court adjudication.[4] If any of the cargo was neutral and the vessel was sunk under the above circumstances, full compensation had to be paid to the cargo owners, and any of the crew or passengers who were neutrals had at least to be carried to a port whence they might reach their destination.

The rules of international law have never permitted the destruction of unresisting neutral merchantmen, unless the vessel is guilty of a grave act of unneutral service. The Declaration of London (Naval Conference 1908-1909) Art. 49, provided that a neutral vessel which had been captured, and which, because of its unneutral service would be liable to condemnation, might be destroyed if her removal to port would involve danger to the safety of the captor or the success of the operations in which she might be engaged at the time. The German Government used this provision as part of its defense of the practise of unrestricted submarine warfare. The exception of military necessity to the duty of taking a captured vessel to port undoubtedly gives a great advantage to a weak naval power; after the cargo has been destroyed and the witnesses dispersed the captor becomes in fact the judge of the necessity.

[3] *Transactions of the Grotius Society*, Vol. IV, p. xxxvi.

[4] Declaration of London, Article 50, German Prize Rules, 116.

Such conditions are applicable to surface craft, and operate satisfactorily when applied to such vessels. When applied to submarines they are hopelessly inadequate. The submarine is a weapon of stealth. Its power lies in its capacity to strike unseen. On the surface it is handicapped, and except for the giant boats which were constructed by Germany near the close of the Great War, are at the mercy of a fast, well-armed and efficiently-manned merchantman, particularly in a seaway. A submarine cannot possibly take aboard or remove to a place of safety the crews or passengers of vessels which it destroys. In that respect a modern cruiser is in much the same position, by reason of its construction. It may be questioned to what extent the deck or hold of a cruiser which may at any moment close with the enemy, is a "place of safety."

Thus the realization of the vast power of the submarine has brought about a situation where the old rules of maritime warfare are entirely insufficient, and it has become necessary to formulate something new to take their place. Unrestricted submarine warfare, on freight and passenger vessels alike, as practised by Germany in the Great War, must in some way be forever abolished. It is unthinkable that there should ever be another *Lusitania*.

The future of the submarine depends, of course, on the retention of the right to capture private property at sea. Today the abolition of this right seems remote, but it has been advocated from time to time.[5] In 1859 the chambers of commerce of Hamburg and Bremen passed the following resolution to memorialize the Congress expected to meet at Paris:

"That the inviolability of person and property in time of war, on the high seas, extended also to the subjects and citizens of belligerent states, except so far as the operations of war *necessarily* restrict the same, is imperatively demanded by the sentiments of justice universally entertained at the present day."

The capture of private property on the high seas is less objectionable than its capture on land. Such capture is generally bloodless, as most merchant vessels are incapable of resisting a man-of-war; it is an interference with a voluntary and insurable venture, not pilferage of the homes of the unfortunate inhabitants of an invaded country, and is less likely to be accompanied by

[5] Woolsey—*International Law*, 4th Ed., N. Y. 1877, Sec. 139.

violence and outrage. The protection of enemy commerce from molestation would rob a great naval power of most of its advantage over one with a smaller navy or none at all, as its navy would be impotent except for attack upon coast defenses.[6]

In 1856 the United States proposed to add to the Declaration of Paris a clause exempting all private property, except contraband, from capture on the high seas, but even this limited proposal was not adopted by the powers represented, Russia alone excepted,[7] and it is doubtful whether with the growth of the naval power of the United States such a suggestion would be advanced today.

Admiral Mahan, in *The Interest of America in Sea Power*, states, "It may be asserted quite confidently that the concession of immunity to what is unthinkingly called the 'private property' of an enemy on the sea, will never be conceded by a nation or alliance confident in its own sea power."

Assuming, then, that the right of capture of private property on the high seas be retained, it is quite inconceivable that a nation of comparatively weak naval power will not, *in extremis*, use the submarine to destroy the commerce which is feeding the armies of its enemies. Rules and concepts of law may seem ideal in time of peace, but unless their character is such that they will be respected and followed by *both* belligerents in time of war, they are worse than futile. Particularly in a nation which is unambitious for imperial power, and whose citizens, not seeing the possibilities of affront and consequent war, insist upon a rigidly economical naval policy, canons of maritime law which may be used as arguments for a reduction of armaments by demagogic publicists, but which would undoubtedly be broken by a ruthless enemy, are treacherous lullabies. War is bereft of sentimentality. A nation which thinks otherwise, and which believes that the rules of war which existed in the days of the frigate can withstand the pressure of modern invention, and prevail today, deceives itself woefully. Wheaton, writing in 1815, said "The object of our enquiry is not, WHAT THE LAW OUGHT TO BE, but WHAT IT PRACTICALLY IS: since it is the latter which furnishes the rule of conduct for those who

[6] Wheaton—*International Law*, p. 570.

[7] Halleck—*International Law*, 4th Ed., Ch. XXII, Sec. 2.

are governed by it. As public, unlike municipal law, is sanctioned not by the power of a single sovereign or state, but by a resort to force among independent sovereigns or states, it is necessarily imperfect in practise, however just and beautiful in theory. The law of nations is adapted to a state of war, and is intended to mitigate its violence. It is, however, frequently compelled to yield to the very violence it was designed to restrain, and becomes the victim of innovations made and enforced by the edicts of particular states and the adjudications of their tribunals. The purity and simplicity of the primitive law of nations, which is nothing more than the law of nature applied to the conduct of nations and states, has thus been corrupted." [8]

It has been said that the rules of humanity are eternal and universal, and can never be broken down by scientific inventions.[9] How can we reconcile the laws of humanity with the hard, cold fact that a nation at war will inevitably use the most potent means that come to hand?

Various suggestions were made during the progress of the Great War, and have been made since its termination. In 1919, the Grotius Society, with membership among publicists and students of international law of many nations, appointed a committee to examine into the legal status of the submarine. The report of this committee, as published in *Transactions of the Grotius Society*, Vol. IV, 1919, suggests that the destruction of enemy merchantmen by submarines should be prohibited except in case of attempted escape or resistance, or belligerent conduct consistent only with the character of a warship. The Recommendations of the Society, based upon the committee's report, but differing somewhat from it, state that visit, search and seizure should be permitted, but prohibit destruction of enemy merchantmen "with the exceptions set out below." No exceptions are, however, set out below or elsewhere, so far as the writer can ascertain. The Recommendations prohibit destruction of neutrals except when resisting visit and search, or engaged in blockade running, or in gross unneutral service, and provide that reasons of military necessity, such as danger to the submarine's or other warship's safety, or its operations, should not be held to justify destruction

[8] Wheaton—*A Digest of the Law of Maritime Captures and Prizes.*
[9] Garner—*International Law and the World War*, Vol. I, p. 379.

under these provisions, and furthermore, that adequate provision must be made in any case for crew and passengers.

Professor Garner reaches similar conclusions. After discussing the necessity of removal of crew and passengers to a place of safety before the destruction of a vessel he states that "Since submarines in the present state of development do not possess such facilities, they should be prohibited absolutely from attacking merchant vessels, except in case of attempted escape or resistance. No distinction should be recognized between the obligations of submarine commanders and the commanders of cruisers to provide for the safety of crews and passengers and this should be definitely affirmed by the new international law."[10]

To hope that nations will abide by any such rules is a fantastic dream. Approach an angry bull with a red flag; wave it in his eyes; then call his attention to several books containing very definite rules for his conduct.

The utter futility of the idea that nations will make war only "in a mild and mitigated fashion, after due notice and according to an approved set of regulations" has been admirably pointed out by Mr. H. G. Wells.[11] If we are to have new rules to govern new conditions, let us at least try to formulate rules which we may hope to see survive a bitter combat.

Modern wars are fought, not only by mercenaries and volunteers, but by entire populations. Even if not actually in the field, every soul in the nation is affected more or less closely by a great war. The officers and crews of merchant vessels are normally drawn from citizens of the nation whose flag they fly. If they are not citizens they receive the benefits of such and may also be said to assume the risks. They are ordinarily of military age, accustomed to hardship and to privation. If not engaged in manning merchant ships, an occupation vital to the prosecution of any war by a seafaring nation, the nationals among them would undoubtedly be subject to conscription into the regular military service.

Why should we so jealously guard the safety of merchant crews? It is perfectly practicable to arm merchantmen with guns up to 6 inches, and to man them with naval gun crews for defense

[10] Garner—*International Law and the World War*, Vol. 2, pp. 456-7.
[11] Article in *The World* (N. Y.) Nov. 9, 1921.

against submarines. Why then, should we not permit belligerent merchant vessels, *carrying freight only,* to arm against submarines, not only for defense, but also for offense, allowing either the submarine or the ship to attack without search or warning? Of course the construction and armament of the merchantman will prevent her from attacking war vessels other than submarines, and as to such other war vessels the prevailing rules as to visit, search and seizure should still prevail.

On the other hand, *non-combatant passengers* should be entirely free from capture or molestation. Certain ships should be selected, to be used only for the carriage of passengers, and to carry no freight whatsoever, using ballast if necessary, and no passengers should be permitted to travel on freight vessels. Doing so should be entirely at their own risk. Such passenger vessels should have precisely the same status as hospital ships, and should be subject to the same restrictions. The names of such ships should be communicated to the belligerents before their employment, and they should be painted in a distinctive manner and have some device for disclosing their identity at night. They should be unarmed, even for defense, and sinking them should be made the most serious of war crimes. To protect against the transportation of combatants an inspection of the passengers before sailing might well be made by the neutral consul in charge of the affairs of the belligerent.

The problem of neutral vessels remains. As far as neutral passenger ships are concerned, the provision for belligerent passengers could be made equally applicable to neutral passenger vessels and would afford greater protection than has in the past usually been accorded to neutrals passing through a war zone. In respect to vessels carrying only neutral freight destined for belligerent territory, it may be that we have been in the past too solicitous of the rights of neutral traders. The spectacle of the profiteers in a neutral nation waxing fat in furnishing the means for a death struggle between other nations is loathsome.

In the days before steam, wireless telegraphy and aircraft, the blockade, in spite of the elaborate restrictions upon its use, was a serious impediment to neutral shipping. Now that the blockade because of these and other inventions is almost obsolete, the submarine has become its natural substitute.

As a practical matter, it is well-nigh impossible for any nation to be entirely neutral. Alliances, ententes and understandings nullify the theory of neutrality. Furthermore, citizens of neutral nations consciously or unconsciously encourage war in the hope of stimulation of trade and exorbitant profits.

We are thus forced to the conclusion that if neutrals wish to trade with belligerents, they should take the chance of such trade. If the rules for neutral and belligerent freight vessels differ, the temptation to use false colors is enormous, and making their use a war crime, as suggested by the Grotius Society (*Transactions of the Grotius Society*, Vol. IV, p. xliii) will not prevent it. We must assume that in time of stress, other nations may adopt the same submarine policy as was adopted by Germany during the Great War and neutrals should look forward to this contingency, and in so far as possible be prepared to meet it. It is urged, therefore, that the submarine be allowed to attack neutral merchant freight ships proceeding into a defined war zone indiscriminately, and that such ships be permitted to arm for defense against submarines. A neutral nation expecting to trade with a belligerent, if it does not wish to arm its own ships, should apply to such belligerent for protection. Defense against submarines by such vessels, on the other hand, should not be construed as an act of war on the part of the neutral and the officers and crews if captured should be unconditionally released.

It may be urged that a rule such as the foregoing as to neutral shipping will tend to draw all maritime nations into any war involving one of them. If this is true and if all nations fully realize what their position as neutrals will be, such a rule should act as a preventive of war as neutrals will be inclined to throw their entire influence against war rather than to encourage it.

In this discussion a sharp distinction has been drawn between passenger vessels and freight vessels and it must be emphasized that passenger vessels must carry only passengers and perhaps first class mail. Their holds if not used for passengers must be light or filled with ballast. That this will make the cost of passenger traffic high is realized, but the privilege of transportation in war time is an unusual one and must always be costly.

The principal crime of the submarine in the Great War was its use against passenger vessels. The temptation to this crime lay

not in the fact that these vessels carried passengers, but in that they also carried supplies which sustained the belligerents, and, in some cases, arms and ammunition. If this temptation be removed the crime will also disappear.

ADDENDA

Since writing the foregoing the rules proposed by Mr. Elihu Root, chairman of the sub-committee of the Arms Conference for drafting resolutions regarding submarines, have been accepted on behalf of the five chief naval powers. They are subject to the same criticism as those of the Grotius Society and of Professor Garner. Furthermore, they are so indefinite in their purport as to lead to endless confusion and wrangling. The resolutions are as follows:

"Section 1. The signatory powers declare that among the rules adopted by civilized nations for the protection of the lives of neutrals and non-combatants at sea in time of war the following are to be deemed an established part of international law:

"(1) A merchant vessel must be ordered to submit to visit and search to determine its character before it can be seized.

"A merchant vessel must not be attacked unless it refuses to submit to visit and search after warning, or to proceed as directed after seizure.

"A merchant vessel must not be destroyed unless the crew and passengers have been first placed in safety.

"(2) Belligerent submarines are not under any circumstances exempt from the universal rules above stated, and if a submarine cannot capture a merchant vessel in conformity with these rules, the existing law of nations requires it to desist from attack and from seizure and to permit the merchant vessel to proceed unmolested.

"Section II. The signatory powers invite all other civilized powers to express their assent to the foregoing statement of established law so that there may be a clear public understanding throughout the world of the standards of conduct by which the public opinion of the world is to pass judgment upon future belligerents.

"Section III. The signatory powers desiring to insure the enforcement of the humane rules of existing law declared by them

with respect to attacks upon and the seizure and destruction of merchant ships, further declare that any person in the service of any power who shall violate any of these rules, whether or not such person is under orders of a Governmental superior, shall be deemed to have violated the laws of war and shall be liable to trial and punishment as if for an act of piracy and may be brought to trial before the civil or military authorities of any power within the jurisdiction of which he may be found.

"Section IV. The signatory powers recognize the practical impossibility of using submarines as commerce destroyers without violating, as they were violated in the war of 1914-1918, the requirements universally accepted by civilized nations for the protection of the lives of neutrals and non-combatants, and to the end that the prohibition of the use of submarines as commerce destroyers shall be universally accepted as a part of the law of nations, they now accept that prohibition as henceforth binding as between themselves, and they invite all other nations to adhere thereto."

Mr. Root fails, however, to define a merchant vessel. What will prevent a vessel, to all appearances a cargo carrier, from engaging in the most unneutral service, or even actually in belligerent naval operations? Already the question has provoked various definitions among the powers. When does a merchant vessel become a warship? It is rumored that the Italians maintain that a merchantman in this connection must be considered as a vessel not armed and not carrying contraband of war; that the British assume that a merchantman is a ship which carries freight or passengers which are not the property of the state and which is itself privately owned, and that unquestionably such a vessel has the right to arm for defensive purposes and to carry munitions; that the French decline to commit themselves at all. The United States is also non-committal. And supposing the altogether improbable, that all nations come to an agreement as to just what cargo and service render an apparent merchant ship a warship, how is the submarine commander to know? Mr. Root has merely repeated the old phrases; he has altogether overlooked the new mechanical situation; he, like Admiral Conflans, tells us that the submarine is not used by polite nations, and that we should fight according to the rules of honor.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

MILITARY CONSERVATISM

ADDRESS BY REAR ADMIRAL WM. S. SIMS, U. S. N.,
President U. S. Naval War College,
19 November, 1921

TO THE GRADUATING CLASS OF 1921

In bidding good-bye to the members of the class of 1921, at the termination of their course of one year at the Naval War College, it has occurred to me that it may be of some interest to invite their consideration of a subject to which too little attention has heretofore been paid, namely, that type and degree of military conservatism which has so often been responsible for defeat in battle, and sometimes for national disaster.

Ever since men first began to use weapons to fight each other, military men have been reproached for excessive conservatism, a polite term often intended to imply a dangerous class reluctance to accept new ideas.

All men are naturally more or less conservative; certainly all civil professions are decidedly so; but they can afford to be without much danger to the country, whereas, in the case of the military profession, national disaster might easily result from a lack of the vision necessary to recognize the superiority of a new weapon or a new method of warfare.

That military men are conservative admits of no doubt. Whether they are more so than civilians is beside the question. The important point is that their conservatism may be so dangerous that it is highly important that they should so train their minds in logical thinking as to eliminate, or at least minimize, this danger.

We hope that the training at the Naval War College will have this effect; and I believe that it will, provided our understanding

of the influence of conservatism in the past is such as to convince us that we must avoid its danger in future. With this end in view it will be useful to invite attention to certain instances of this defect that are recorded in the history of warfare, and also to certain recent instances that will show the influence it has exerted, and perhaps is still exerting, upon the minds of our contemporaries. These latter illustrations will include a number of instances that are within my own experience, and doubtless some of these are within your recollection; and from them we may be able to determine the cause of the state of mind in question, and possibly to indicate the remedy.

So strong has been the resistance to the general introduction of any new weapons or methods of warfare that one is almost forced to conclude that the military classes of all ages were all recruited from the Missouri of their respective countries. However this may be, it may be stated in general terms that most arguments in favor of fundamentally new weapons have failed except those that resulted in shedding the blood of the unbelievers; that defeat alone has been accepted as a final demonstration. The following are a few examples of the nature of the resistance in question, beginning with ancient times in order to show that this influence has been continuous, and that such conservatism as we retain at present is a legitimate inheritance from our naval forebears:

Considering, first, the most primitive weapons, there is no doubt but that the bow was a vastly more efficient instrument of warfare than the sword, the mace, or the pike; but almost without exception it was never accepted as a proper arm for the knight or warrior. The ancient wars were mainly fought with the sword and javelin, and both Greeks and Romans looked upon the bow as plebeian. It was not until the decline of the Roman Empire that the bow was used to any large degree by the Romans, the victory over the Franks at Casilinum (A. D. 554) being won by the horse-archers.

The warriors of medieval Europe viewed the bow in the same way. Thus Charlemagne endeavored to dignify and extend its use by edicts and the establishment of schools of archery, but to little avail, for the bow remained, until supplanted by firearms, the arm of the inferior classes and the yeomanry.

The cross-bow was an advance over the bow in power and efficiency but it never became the predominant arm, although it was extensively used during the Crusades. In A. D. 1139, the Lateran Council condemned its use as a murderous weapon. This resulted in a partial abandonment of it as a mode of warfare. The attitude of the nobleman respecting the cross-bow is indicated by the action of Philip of France at the battle of Crécy (August 26, 1346), who rode down his Genoese cross-bowmen with the words, "Forward and strike down this useless rabble, who are thus blocking up the way in our front." But Crécy was won by bowmen, the English archers, who, unlike the Genoese, had kept their bow-strings dry, devastating the chivalry of France.

"A first-class English archer," said Prince Louis Napoleon, "who in a single minute was able to draw and discharge his bow twelve times with a range of 240 yards, and who in these twelve shots only once missed his man, was very lightly esteemed."

It would seem that there was for many centuries a settled prejudice against projectiles, or perhaps rather against the men who launched the projectiles, because it was considered that these men required less courage than the wielders of short-arm weapons. This prejudice persisted for a considerable period even after the introduction of firearms.

Although gunpowder is said to have been discovered in Europe by Roger Bacon during the early years of the 13th century, it was not until 1338 that we have any account of the use of artillery. This was at the battle of Cambrai. Cannon are again mentioned as used in the battle of Quesnoy (1339). At this time, however, they were looked upon as curiosities more than anything else, and it was the general opinion of military experts that artillery would not supplant the sword and the pike.

In fact the pike or the lance was considered superior to the gun as late as the 18th century. We know that the Emperor of Germany changed his pikemen to musketeers in 1689, which led Louvois, the French minister, to propose a similar change in the armies of France. Louis XIV, however, while he confessed that he was impressed by the minister's arguments, said that he did not consider them strong enough to warrant such a great change. Pikes were not abolished in France until 1703. Incidentally, they were still supplied to our ships 180 years later.

Nor was our cloth less conservative as regards the introduction either of weapons or of methods of propelling war vessels. For example, it is apparent that oars were used more than sails in the sea battles of the ancients. The sail was mainly an auxiliary. The Egyptians, the Romans and the Greeks all trusted to the oar on account of its freedom from weather conditions. This attitude persisted quite to modern times; the battle of Lepanto (1499) was fought with galleys, and the Spanish Armada (1588) contained a great number of galleys. Artillery did more to do away with the oar than anything else, for the guns occupied the positions of the oarsmen.

Also Mahan states in *From Sail to Steam*, that: "The parting with sails as the motive reliance of a ship of war was characterized by an extreme conservatism. Steam was accepted first as an auxiliary, for towing, etc. A man of unusual intelligence maintained that steam would never prevail over sail; the steamer 'broke down,' and owing to the fuel question could never be as self-contained as a sailing ship. Admiral Baudin, a Napoleonic veteran, was very sarcastic over the uncertainty of steamers."

And Wilmot, in his book *The Development of Navies*, states that: "In England we were disposed to rely on what had in former years admirably answered the purpose, and given us supremacy on the sea by which the security of the country was ensured. Had our fleet suffered defeat, we might have been more ready to adopt new inventions, indeed, to initiate them, rather than wait until their utility was proven by others."

Barnaby, in his *Naval Developments of the Century*, shows the extreme reluctance of those in authority even to consider the adoption of new weapons. He states that: "This demand of the fighting man for the most perfect weapons throughout the entire armoury, however often the change may be necessary, has a curious effect upon the good Admiralty and War Office official. He does not hesitate to take up an attitude of hostility to all innovation and to do his best to suppress it. Sad experience as to what advancing tides will do is perhaps working changes in the official mind, but the author well remembers the authority and seriousness with which the doctrine was held fifty years ago."

Wilmot again states that: "The discovery that steam could be profitably utilized for the propulsion of ships, and the tardy

adoption of the screw, did not for many years materially affect the construction of war vessels. There was a strong prejudice to overcome in the minds of those who retained a vivid recollection of the glories accomplished in the past under sail, and who had a natural love for the art in which we excelled. Rear Admiral Sir William Symonds (director of naval construction), to whom I have alluded as effecting considerable improvement in the qualities of our sailing ships, had, as his biographer states, no love for steamers in any shape. . . . In a letter to Lord Auckland . . . he states: 'I consider steamers of every description in the greatest peril when it is necessary to use broadside guns in close action; not alone from their liability to be disabled from shot striking their steam-chest, steam-pipe, machinery, etc., but great probability of explosion owing to sparks from funnel.'"

His opposition was so great that he was forced to resign in favor of a committee of naval architects, under Sir Baldwin Walker, "a naval officer distinguished for his seamanship;" but this officer's distinction in this respect was such that progress under his control is described as follows by a British historian:

"The naval members of the Board of Admiralty were men who had long looked upon the noble line-of-battle-ships of the navy as not to be surpassed, and they could not apparently make up their minds to desecrate them, as they seemed to consider it, by the introduction of steam power. The result of this somewhat romantic feeling was, that early in Sir Baldwin Walker's administration a number of sailing three-deckers were laid down, in opposition to the expressed opinion of the leading civil professional officers attached to the Admiralty. Not one of these vessels, as had been predicted, was ever launched as a sailing vessel. They were converted into screw ships by being lengthened in midships, at the bows, and also at the sterns. The greater proportion of the other sailing three-deckers were also cut down and converted into two-decked screw ships, their sterns only being altered."

Inventors have always had a hard time in convincing high naval officials of the merits of their inventions. It usually required the pressure of war necessity or strong political influence, or both, to insure even a hearing. Fulton and Ericsson are cases in point.

Fulton's *Demologos,* a steam-propelled floating battery, contained all the elements essential for a battleship today—positive and well-

protected motive power, heavy battery, and impregnable armor, the latter five feet of solid wood; but naval officers insisted upon masts and sails and heavy bulwarks to protect those handling them. "Thus, on the first possible occasion, did steam and sail power come into conflict, and steam had to take the inferior position."

In 1837-38 Ericsson was unable to gain recognition from the Admiralty, and in 1839 he returned to America and, under the patronage of Captain Stockton, one of the few officers who favored the use of steam, superintended in 1842 the building of the sloop-of-war *Princeton,* the first screw steam vessel of war built in any country.

In the fifties Congress ordered the building of "six first-class steam frigates." They were full-rigged ships but with steam power so ridiculously small as to call forth the following comment from the Late Rear Admiral Edward Simpson:

"There were those at that time who, wise beyond their generation, recognized the full meaning of the advent of steam, and saw that it must supplant sails altogether as a motive power for ships. These advocated that new construction should be provided with full steam power, with sails as an auxiliary; but the old pride in the sailing-ship, with her taut and graceful spars, could not be made to yield at once to the innovation; old traditions pointing to the necessity of full sail power could not be dispelled; it was considered a sufficient concession to admit steam on any terms, and thus the conservative and temporizing course was adopted of retaining full sail power, and utilizing steam as an auxiliary."

Barnaby states that: "There was the same prejudice against the adoption of iron for vessels as for the adoption of steam propulsion. Furthermore the opponents of armor were sufficiently entrenched to delay the adoption of these new ideas for years. Iron was first used in vessels in 1812, but it was not until 1834 that the British Admiralty began to make experiments in this field, and not until 1845 that an armored ship was produced by Laird."

The introduction of armor was opposed very strenuously for many years. Barnaby further states that: "In 1876 Admiral Sir George Elliott circulated a pamphlet designed 'to stop the useless expenditure by the Admiralty of vast sums of money on the ships ordered by them not because the ships were partially unarmoured,

but because they were armoured at all. In that pamphlet he declared armour-clad ship-building to be the result of want of foresight. . . .But he contended that the evidence of the superiority of the gun, and the developments of the efficacy of the ram and the torpedo had deprived us of sufficient excuse of late years to continue to fight the losing game of armour against guns."

"The great naval tactician, Sir Howard Douglas, in 1858, published a book entitled *Naval Warfare With Steam* in which he said that the *Renown* was the best type of war vessel in the British navy. This vessel was unarmoured."

In comparatively recent times we have seen wide fluctuations of opinion as to the relative importance of armor and volume of gun-fire, including Farragut's unfortunate phrase, "The best protection against the enemy's fire is a well-directed fire from our own guns."

This phrase had a profound influence upon the design of ships in certain navies. The Russian cruisers of the *Gromoboi* class were equipped with a battery so heavy for their displacement and speed that not only were many guns left without armor but the personnel of her ammunition supply was so exposed that she fell an easy prey to a Japanese vessel of the *Asama* class, with half the number of guns all adequately protected.

The long and costly controversy over the adoption of breech-loading guns is too well known to require reference to more than the very significant fact that purely mechanical difficulties were constantly allowed to overshadow in importance the fundamental principle involved. Breech-loaders were installed in the British navy, replaced by muzzle-loaders, and reinstalled until their final adoption in the latter part of the 19th century. Thus Barnaby states:

"In 1875, owing to accidents to breech-loaders, the muzzle-loader was reinstated in the service. The great munitions firm of Armstrong fought the breech-loader for years and was instrumental in deferring its adoption. The firm, of course, was supported by many naval officers."

"The breech-loading guns might have been retained for all they were worth, and in course of time men would have become familiarized with them. Defects and weaknesses would have been soberly valued and gradually removed. . . . We had to

pay heavily for that and we are called upon now to reverse the process and get rid of all ships having a muzzle-loading armament."

But while ordnance experts were vigorously discussing the question as to the end of the gun into which the projectile would best be inserted, and were still blind to the profound influence the breech-loader necessarily would exercise upon the design of war vessels, they were no less strenuously resisting any improvements in the projectiles themselves. Some of their arguments are curious, and some amusing, particularly those concerning the great cost of the shell of that day. Thus Wilmot states that:

"The old prejudice in favor of solid shot was not easily overcome. The latter were said to be more accurate, and to have greater range and penetration than hollow shell. Objections were also raised to putting too many shell guns in ships on account of the danger of accidental explosions.

"Another argument used against the introduction of projectiles was their cost. Sir Howard Douglas, in his work on *Naval Gunnery* says, 'the expense of shell equipment is enormous. The cost of every 8-inch shell in box is 11 s. 6 d., or $2.78, and each one fired costs 17 s. 4¾ d., or $4.17. (1838).'"

Having in the above account convicted the officers who were before our time of a degree of conservatism that was at least very dangerous to the success of their navies, the question arises as to whether the record of our contemporaries is any better. It is to a certain extent, because during the last fifty years we have become so accustomed to great advances in all mechanical appliances and scientific processes that it is hard to surprise us by anything new in these lines.

During the lifetime of officers still living it may be said that navies have advanced from wood and sails to steel and steam. Some of our senior admirals began their careers on full rigged wooden vessels with feeble auxiliary steam power and smooth bore guns.

During a visit I made to the Portsmouth dockyard in 1905, the first dreadnought was anchored in the harbor alongside Nelson's *Victory*, and the admiral in command of the yard invited attention to the enormous progress that had been made since he began his career as a middy when vessels of the *Victory* type were still standard capital ships.

This rapid progress has of course tended to diminish conservatism as much in foreign navies as in ours; but the important question now is as to whether the training we are actually giving our officers in systematic and logical thinking will enable our navy, not simply to adopt improvements after their value has been proved in foreign navies, but so to utilize our undoubted inventive ability, and so promptly to recognize demonstrated facts, that we may keep safely in the van of progress, and thus eliminate the danger of being outclassed through the superior vision and alertness of possible enemies.

In this connection it may be useful to invite attention to two very significant facts:

First, that America has been distinctly in the lead in originating many important features of naval design, and in the invention of types and weapons of fundamental importance I need cite as examples only the monitor, the submarine and the airplane. There are many others.

Second, that, generally speaking, our navy has lagged behind in the adoption and general application even of our own American improvements and inventions. Many of our inventors have had to go abroad for recognition.

This indisposition on the part of our navy at once to utilize new ideas, weapons and methods of demonstrated value is a fact of supreme importance. In fact it is the gist of this whole subject. It is due to a habit of mind that could be indulged in the past with comparative safety, but which is manifestly a danger to a country that has become involved in international politics, and whose policies are likely to be disputed by other powers.

This habit of mind was not the result of a lack of intelligence or patriotic interest, but was due chiefly to the long period during which our country was relatively free from foreign entanglements, and, consequently, when we so lacked the pressure of the probability of war that is continuously felt by European nations, that we naturally thought we could afford to let other navies experiment with, and demonstrate the usefulness of, new designs and weapons before we adopted them. We can no longer safely do so. In order fully to realize the extent to which at times we have been unprogressive it will be necessary briefly to review our attitude in the immediate past, and thus show why we must, and perhaps how we can, avoid this danger in future.

Almost all controversies over questions of the adoption of new methods or weapons have had one perfectly natural feature in common: they have been contests between the younger men with their naturally more progressive minds and the more conservative seniors at the top of the list who had the power of decision. This has been as true in former times as it has been in our time; and moreover, it goes without saying that while in general such controversies have been based upon honest differences of opinion, sometimes strongly influenced by natural conservatism, still they were not free from the influences of our fallible human nature.

Criticisms from juniors fall with great severity upon the responsible seniors, especially in a military service; and questions of personal ambition, and the assumed necessity of defending established reputations, both of men and of organizations, do not create a condition of mind that is favorable to the reception of new ideas. The consequence too often has been successful resistance on the part of responsible naval officials, sometimes continued until overcome by the civil authorities or by the force of public opinion.

It is doubtless well known to all of you that in the past our navy vigorously resisted the introduction of steam propulsion, then reluctantly consented to auxiliary steam with full sail power, then to full steam with auxiliary sail power, and finally, but very tardily, gave up sails altogether. There was the same opposition to the introduction of armor, breech-loading guns, and other improvements of minor importance; and nothing but the extreme pressure of war necessity overcame the opposition to Ericsson's monitor. It is not necessary to review all of these phases of our navy's resistance, as they were similar in all respects to those already noted in the experience of the British and other navies; but it should be recorded that these controversies were fought out in some instances not only with extreme bitterness but with an apparent inability or indisposition to accept the plainest possible evidence.

This was not simply conservatism, it was conservatism complicated not only by national conceit, but by personal interests and human passions, and too often, by a certain degree of dishonesty exhibited in the defense of reputations.

In order to accentuate the military necessity of logical ability and intellectual honesty in reaching decisions that may be vital to the efficiency of military forces, I will review briefly the kind and degree of opposition that had to be overcome in order to accomplish the general adoption only of the most important of all modern improvements, namely, the new methods of gunnery training, the all-big-gun capital ship, and the submarine.

These improvements are probably within the experience of all officers present, but I think it is doubtful whether many of you are aware that there was much opposition to their adoption, and still more doubtful that you are informed of its nature or intensity. The extent of this opposition is hereinafter described for the sole purpose of inviting attention to the errors in this respect that we seek to avoid in future. That such errors must hereafter be avoided is apparent from the fact that in all three of the cases just cited—gunnery training, the dreadnought type of design, and the submarine—our resistance left us so far behind other navies that if war had been declared before we had adopted such fundamental improvements we would, in all probability, have suffered defeat in consequence.

As regards efficiency in gunnery it would seem that the naval mind has always been particularly self-satisfied. Even an officer of such vision as Nelson, when asked to grant an interview to an inventor of an improved method of aiming the guns of a ship of the line, consented to receive him but said he did not expect to live to see the day when it would be necessary accurately to aim these guns, as he always expected to engage the enemy within pistol range.

The risk that the British navy ran becomes apparent when we consider that the effective range of the guns of the period was about 3,000 yards, particularly against the enemy's rigging; that simple mechanism for pointing the guns was easily realizable; and the slow approach, for example, at Trafalgar, would have permitted the enemy to fire ten or twelve broadsides before the British ships closed to the range at which they could hit without aiming.

In 1895, while serving as intelligence officer of a vessel on the China Station, I made reports upon some sixty odd foreign men-

of-war. These included a description of a new cruiser of the *Edgar* class, and of the British so-called "H" sight, and an account of the, at that time, quite extraordinary number of hits-per-gun-per-minute made by the *Edgar's* 6-inch guns fitted with these sights. These results were so far in advance of ours that the reports were probably not believed. At all events not only was no attention paid to them at the Navy Department, but they were considered of so little value that they were all destroyed.

During the four years from the beginning of 1897 until the latter part of 1900, I made from France and Russia extensive reports on the gunnery training of the French and Russian navies. France was at that time firing at relatively long ranges; the Russian training, though largely mistaken in principle, was probably the most complete and extensive of that of any navy, and her expenditure of ammunition was by far the greatest. Reports on ordnance, construction, and so forth, during this period showed a great superiority of design over the astonishing inefficiency of our contemporary ships. In all, these reports comprised over eleven thousand pages. They produced no appreciable effect at the time, and were not only destroyed but the letter-press copies in Paris were burned by order of the Navy Department.

In 1901 and 1902 many reports were submitted from China on the design of foreign ships, their systems of protection, ordnance mechanism, methods of gunnery training, and so forth. These included a comparison showing that notwithstanding the relative weight of armor carried by the *Kentucky* class, then just commissioned and the pride of our navy, their turret and broadside guns were greatly exposed, and even their magazines were so open as to render it very dangerous to fire the guns. This report attracted some attention at the Navy Department. It promptly disappeared and was never thereafter located; and the defects to which it invited attention were defended up to, and even after, the fearful turret accidents that caused the death of so many officers and men in the turret explosions in the *Missouri, Kearsarge, Georgia* and other vessels.

During the same period extensive reports were made upon Captain Sir Percy Scott's method of training gunpointers by means of the dotter. Not only were the records made at Scott's target practices disputed, but the most fundamentally important improve-

ment recorded in the history of naval artillery, that is, the continuous aim that enables us to hit at long ranges, and which has consequently profoundly modified the design of war vessels, was not only ridiculed as absurd, but it was officially "proved" to be so by an elaborate paper prepared by the Bureau of Ordnance to show that it was mathematically impossible for a pointer to keep a six-inch gun on a target throughout a roll of even a few degrees.

All the reports just mentioned that were submitted from China were destroyed. The effort to secure the adoption by the Navy Department of the improvements in question was at the time a flat failure, notwithstanding the fact that the commander-in-chief of the China Station, Admiral Remey, brought them to the attention of the Navy Department in special communications, in which he stated that the situation was extremely critical as regarded the design of our vessels, the mechanism of our ordnance, and the training of our gunnery personnel.

The new system of gunnery training and fire-control was at that time opposed by the great majority of our senior officers, many of whom expressed their disapproval in letters to the Department advocating the retention of our former practice of requiring each gun-pointer to estimate the range and control the fire of his own gun. This opposition produced an order requiring that all men, including mess attendants, should frequently be exercised at estimating distances.

Subsequently, our inefficiency in gunnery was brought directly to the attention of President Roosevelt, who issued peremptory orders that the new methods of training should at once be put in practice and that all guns should be fitted with efficient sights. Under this order, our marksmanship developed with great rapidity, though the system of training was still opposed by practically all of the senior officers concerned, including, for example, all but one of the captains of the North Atlantic fleet.

When in 1903 and 1904, this development had demonstrated the accuracy of heavy turret guns at distances beyond the effective range of the secondary battery, and when, in consequence, a number of our junior officers opposed the building of any more mixed caliber ships and recommended the all big-gun ship, or dreadnought type, the recommendation was successfully opposed by most of our senior officers, including Admiral Mahan, until its

adoption was forced by President Roosevelt. But for this conservative attitude we would have launched the first dreadnought. A painting in my possession of the design recommended is dated 1904.

Many of you may remember that this opposition was based chiefly upon the Department's official opinion that the greater the calibre of the gun the less its ability to hit; also upon the singular opinion implied by the phrase "the smothering effect of the fire of the small secondary battery guns"—a phrase without meaning when applied to the fire of such small guns against battleship armor, but, nevertheless, tenaciously believed in for many years by some of our leading authorities—a striking example of the peculiar power of a picturesque phrase when substituted for the careful reasoning that is of such vital importance in military matters.

In the case of all the vitally important improvements indicated, we have followed instead of leading. Sometimes we have not even followed though outclassed by new types in all important navies. All competent students of naval warfare have long since recognized the necessity for battle cruisers, particularly if our possible enemies possess them; but until recently our navy has failed to recommend them to the Congress, though for a great many years their value has been conclusively demonstrated on the game board.

The case of the submarine need be hardly more than mentioned. Though American designers of this type of vessel are responsible for most of the principles upon which its success depends, they received so little encouragement from our navy that not only was the first practical development in foreign navies, but even as late as our entry into the Great War, the capabilities of this type of vessel were seriously misunderstood.

The same is true to an even greater degree as regards the development of the airplane as a weapon. Even while foreign countries were appropriating large sums of money and were making every effort to develop it, our naval authorities were actually resisting its introduction.

These are only a few of the instances of the deadly effect of unreasoning conservatism. Many others could be cited in connection with practically every more or less radical departure in

design, weapons, methods or appliances. Generally speaking, all such improvements have met with more or less effective resistance from those in authority; and the examples cited show that this resistance has been in certain important cases so very determined as to cause juniors to think twice before placing themselves definitely in opposition to their seniors; and it should be specially noted that the more important or fundamental the improvement advocated, the more strenuous and prolonged is likely to be the opposition, and consequently, the greater the danger of delay in giving it impartial and unprejudiced consideration.

It is by reason of this attitude that our navy found itself so absurdly deficient in marksmanship during the Spanish war; so deficient in destroyers, submarines and airplanes when we entered the Great War; and it is for this reason that we are still without battle cruisers.

The rapid development of the submarine and the airplane during the war, and the continuous development of both, and especially the latter, since the war, have shown that these powerful weapons are still in their infancy; that great possibilities of development are clearly in sight; and that it will require the most careful, devoted, and logical consideration upon our part even to keep abreast of the developments in foreign navies, much less to anticipate these developments.

Are we approaching the consideration of the influence of these revolutionary weapons in a judicial frame of mind? I am afraid not, in view of recent examples of minds absolutely closed to the plainest facts. In spite of adequate experiments clearly showing that airplanes could make a certain percentage of hits upon ship targets, a secretary of the navy expressed his disbelief in the ability of bombing planes to injure a vessel by affirming his willingness to stand upon the bridge of the *Ostfriesland* during the proposed bombing experiments. It is of course not remarkable that a civilian should have made such a statement; but it is very significant that this statement was based upon similar statements by naval officers and upon the assurance of naval advisers who were suffering the blighting influence of conservatism to an extent not exceeded by that of any of the examples just cited from history and from recent experiences.

So great indeed was the unwillingness to admit anything at all to the disadvantage of the battleship that many of our senior officers solved the difficulty for themselves by simply denying all the claims made by the airmen. For example, a captain on duty at the Navy Department expressed the opinion that a battleship can shoot down planes as fast as they attempt to get into bombing position; that even unopposed bombers could not hit a vessel underway; and in any case that bombs would not do much damage; that a bomb exploding on the protective deck would not penetrate below if it contained less than three thousand pounds of T.N.T.

Manifestly, our mental attitude in these matters must be radically changed unless we are to repeat the errors of the past, and cause our navy to follow instead of leading.

Verily, we must be on our guard against the dangers of a lack of vision and of a lack of confidence in the conclusions derived from a candid and logical examination of the significance of established military facts.

Our objective must not be *"safety first"* in the sense of adherence to already tested practices and implements, but safety first in being the first to recognize, the first to experiment with, and the first to adopt improvements of distinct military value.

Doubtless many of us have suffered from pain of a new idea, and some have recorded their suffering in writing. I remember ridiculing many years ago an imaginative article, describing a naval battle of the future, because the author had ships destroying each other by gunfire at 12,000 yards; and I am consoled only by the fact that many of my seniors inveighed at the time against the absurd idea that naval actions would ever be fought at "the enormous range of 7,000 yards."

Our navy has in our own time passed through periods of great danger. At the battle of Santiago we made but three per cent of hits at ranges shorter than are ever likely to occur again; and so inefficient was our gunnery up to 1900 that an equal force of ships of any efficient navy could have inflicted upon us a most humiliating defeat.

In my opinion we are now entering a period that may become still more dangerous if we fail correctly to interpret the significance of the rapid development of fundamentally new weapons of

enormous destructive power and of relative immunity to effective resistance by any means except a decisive superiority of similar weapons.

We may escape this danger in future, as has so often been the case in the past, through the superior vision of a Roosevelt, or through the pressure of public opinion, overcoming the excessive conservatism of military minds.

From the above examination of this important subject, I think it is apparent that the remedy we seek is comprised in a combination of logical ability and military character—the ability to reach sound conclusions from established facts, and the character to accept, adopt, and fight for these conclusions against any material or spiritual forces.

A navy to be successful must be guided not only by men of ability but by men of an intellectual honesty that is proof against personal ambition or any other influences whatsoever.

Which of us will be quoted in future as examples of dangerous conservatism? Of which of us will it be said that we were of:

> The many who follow the beaten track,
> With guideposts on the way;
> They live and have lived for ages back
> With a chart for every day.
> Someone has told them it is safe to go
> On the road he has travelled o'er,
> And all that they ever strive to know
> Are the things that were known before.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

UNDER WHICH GOVERNMENT DEPARTMENT DO SHORE RADIO STATIONS BELONG?

By Comdr. S. C. Hooper, U. S. Navy

In reviewing the subject of the utilization of wireless or radio as a medium of communication, with a view to possible modifications in the existing government policy as established by President Roosevelt in 1904, and having in mind the national interests, now and in the future, not only from the viewpoint of economics but also the national defense and our responsibilities from a humanitarian point of view, consideration should always be given to four aspects of the question which obviously are of primary importance, namely:

(a) The highly technical nature of the comparatively new radio art which is virtually in its infancy particularly as regards development, with the consequent necessity—especially in the interests of the national defense—for consistent investigational, research and development work, to insure that the most modern radio facilities, for the exchange of communications, and also defensive and offensive naval tactics, will be available for use, primarily by our Atlantic, Pacific, and Asiatic fleets in time of war, and for the safety of life and property at sea, and secondarily by the military service and for general public and governmental uses.

(b) Interference from atmospherics and interference between stations and the vital necessity of greatly lessening or entirely eliminating such interference. The growing seriousness of the problem of interference with the constantly increasing number and power of radio stations can be appreciated only by radio operators who are charged with the responsibility of getting their traffic through.

(c) The present use and potential possibilities of radio waves, and also sound waves, for other than communication purposes,

i.e., as an aid to navigation for ships and aircraft (radio compass and radio piloting cable), location of enemy ship, shore or aircraft stations in time of war (radio compass), to assist aircraft in night flying and landing (radio beacon under development), radio control of ships, aircraft, torpedoes, in time of war, detection of submerged submarines (sound waves), etc.

(d) *The fact that radio is the only known medium of communication available for use by ships at sea separated beyond visual distances, and between ships at sea and the land.* This consideration is of prime importance from a humanitarian, as well as a naval point of view, and it vitally affects our merchant marine. Obviously the responsibility rests with our government to see to it that the establishment of radio services in the interior, where land line communication facilities are available—either by government or commercial interests—shall not impair the efficiency of the essential ship radio service.

Atmospheric interference caused by electric discharges between clouds during electric storms, and by other reasons which are not thoroughly understood, are a veritable nightmare to the operating personnel, as these disturbances are taking place almost continuously in some part of the world, and they manifest themselves in greater or less degree in the receiving operator's head phones. Interference between stations themselves is no less serious, and in fact, with the constantly increasing number and power of the stations, not only in the United States but throughout the world, the interference between stations is constantly being aggravated, notwithstanding the best efforts of all radio interests throughout the world to produce and employ more selective transmitting and receiving equipment.

The interference between stations can be appreciated when it is considered that, in the present stage of development of the radio art, and until the advent of vacuum tube transmitters in general service, not more than 300 separate wave lengths or "ether routes through space" so to speak, may be put in practical service use, although there are from 4,000 to 5,000 American radio ship and shore stations alone, including naval and merchant ship stations, government and commercial shore stations.

A radio transmitting station which has an effective daylight range of say 1,000 miles during the summer months, may easily

have an effective range of 3,000 to 4,000 miles at night during the winter months. It is impracticable, therefore, to effectually limit the ranges of transmitting stations and stations established in the interior may seriously interfere with essential communications with ships at sea under varying conditions.

It has been suggested that it would be in the national interests to transfer the naval coastal radio stations to the post office department for maintenance and operation by civilian personnel, leaving the naval ship stations to be maintained and operated by naval personnel as at present.

There are nine potent reasons why the naval shore radio stations should not pass into the control of the Post Office Department.

ECONOMY

(1) The navy must always have its radio organization—in Washington, in the navy yards and afloat—to provide, install, maintain and repair the radio installations on ships and aircraft and to operate the equipment.

The navy organization in the field, based on the various navy yards, now handles the shore stations with the ship and aircraft stations without any appreciable increase in expense or of personnel, due to the fact that the work at the shore stations can ordinarily be taken care of during times that ships are not in port, material and equipment is stored with general stores at the yards, shop facilities of the yards are available for repairs, etc.

If the coastal stations should be transferred to another department of the government the purchase, transportation and storage of complete apparatus, spare parts, and material would be handled by two separate departments instead of one, and two administrative and field organizations would be maintained with the consequent inevitable increase in government expenditures due to separate storage space rentals, duplicate stock carried on hand, increased personnel, overhead, etc.

In the event of the transfer of the coastal stations to the Post Office Department civilian personnel will be employed, replacing the naval enlisted and officer operating personnel, and additional technical and supervisory personnel will be necessary.

The naval enlisted operator's pay averages approximately $75 per month and $30 per month subsistence or approxi-

mately $1,260 per year. It is understood that the Post Office Department now pay their radio operators $1,800 to $2,000 per year. It is not known what they pay their supervisors in the field.

Present living quarters must be maintained at most of the stations regardless of which department operates them, as most of the stations are at isolated localities along the coasts and the personnel must live at the stations.

It is obvious from the foregoing that a change would inevitably result in greatly increased government expenditures.

RESEARCH AND DEVELOPMENT

(2) The navy organization must also be maintained to develop radio and sound equipment for naval vessels and aircraft. It should be borne in mind, in this connection, that radio, and also sound, are now extremely important mediums, not only as regards communications in connection with safety of life at sea and for general communications and navigational purposes in time of peace and war, but particularly as regards naval tactics in time of war (radio controlled ships, radio controlled torpedoes, location of submerged submarines, etc.).

It is essential, therefore, that our radio and sound research and development work at least keep abreast of the art and of developments in foreign countries, and this work must be carried on by the navy regardless of what other government departments become interested in radio.

DUPLICATION

(3) Should the coastal stations, which must handle a large volume of military traffic, be placed under the Post Office Department, the inevitable tendency would be for the post office civilian personnel to give such preference to commercial traffic that the army and navy would eventually not only find it necessary to handle their own traffic through such special stations as they would retain with their own specially qualified personnel, but new special stations would be permitted to grow up and eventually we would have not only the army and navy special stations which now handle both military and commercial traffic, but also a separate chain of post office or purely commercial stations.

Our attempt to avoid duplication would inevitably result in duplication to an even greater extent.

The revenue derived from commercial traffic handled through coastal stations will not nearly pay for the maintenance and operation of the coastal stations and the primary justification for their existence is to afford safety to life and property at sea, to serve our Atlantic, Pacific and Asiatic fleets and for general military purposes.

The retention of the coastal stations, now used for both commercial and military traffic, under the department primarily interested in the maritime service, is bound to result in the least possible duplication of effort and governmental expenditures.

GENERAL EFFICIENCY

(4) The radio communication service is vital to the interest of the mariner as outlined in the foregoing. The Post Office Department will never have the knowledge of these interests that the navy will always be in a position to have.

On account of technical difficulties, mainly through interference, the use of the radio is decidedly limited, and, being limited, must be safeguarded for the service which cannot have land wire facilities.

The uses comprise primarily, communications between ships at sea, for ships communicating with shore, for ships navigational use in thick weather, and for aircraft where absolutely necessary to make landings.

Secondarily, for competition with the cables overseas in order to improve the service and reduce rates. (This does not interfere with the land stations due to the long wave lengths adopted for oversea use, and the natural use of shorter waves for shorter distances on shore.)

If a maritime department has jurisdiction of the radio, the ships at sea, naval and merchant, will be assured of preference, also the military will be looked out for satisfactorily.

If, however, a non-maritime department has control, the inland service will become the strongest, and those which should really be given preference will pass into the background, and the prime use of radio will become its secondary one.

This is perfectly sure to happen as the politics of the interior have little regard for the demands of the ships which are not so strong in their representation.

Officers and enlisted men trained in naval problems at sea, when on duty at shore radio stations can visualize conditions at sea and give superior service to mariners than would ever be possible under a civilian department.

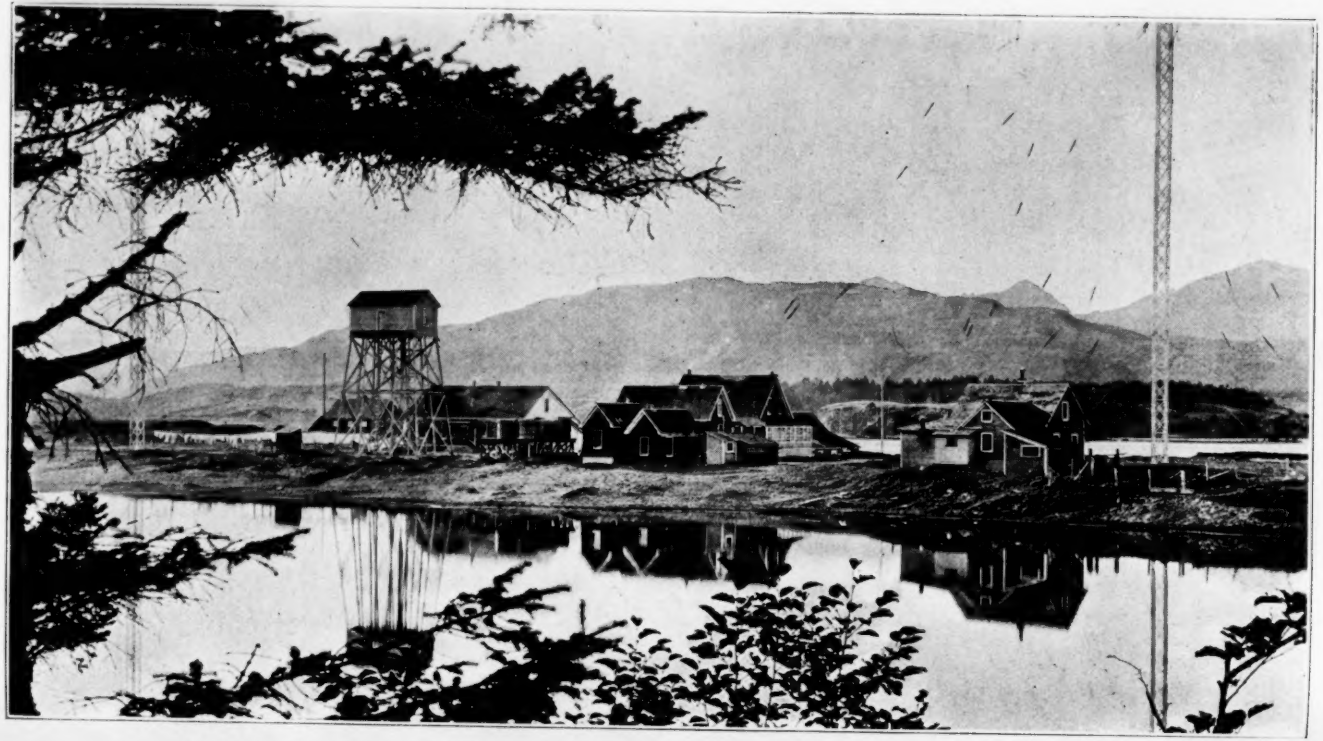
SPECIAL STATIONS

(5) There are special coastal stations which, it is believed, it would be impracticable for the Post Office Department to administrate and operate in any event and if this should prove to be the case there could at best be only a partial transfer of the coastal stations and this would likely lead to confusion as well as increased expenditures with inferior service.

Particular mention is made of our outlying stations established for the fleets and usually located within naval stations.

Peking, China (Asiatic Fleet).
Vladivostok, Siberia (Asiatic Fleet).
Cavite-Los Banos, Philippines (Asiatic Fleet).
Olongapo, Philippines (Asiatic Fleet).
Guam-Merizo, Marianas (Asiatic Fleet).
Pearl Harbor-Heeia-Wailupe, Hawaii (Pacific Fleet).
Tutuila, Samoa (Pacific Fleet).
Darien-Colon-Coco Solo-Balboa, C. Z. (Pacific and Atlantic Fleets).
Cape Mala, Republic of Panama (Pacific and Atlantic Fleets).
Puerto Obaldia, Republic of Panama (Pacific and Atlantic Fleets).
La Palma, Republic of Panama (Pacific and Atlantic Fleets).
Managua, Nicaragua (Marine Corps) (Pacific Fleet).
San Juan-Cayey, Porto Rico (Atlantic Fleet).
Camaguey, Cuba (Marine Corps) (Atlantic Fleet).
Guantanamo Bay, Cuba (Atlantic Fleet).
Port au Prince, Haiti (Marine Corps) (Atlantic Fleet).
Santo Domingo, D. R. (Atlantic Fleet).
St. Thomas, Virgin Islands (Atlantic Fleet).
St. Croix, Virgin Islands (Atlantic Fleet).

There are also ten naval radio stations located mostly at isolated points in Alaska in connection with which the U. S. S. *Saturn* makes annual radio expeditions from the navy yard, Puget Sound, to carry supplies, effect new constructural work, make repairs, etc.



VIEW OF ONE OF THE NAVY'S ISOLATED RADIO TRAFFIC STATIONS, SITUATED AT KODIAC, ALASKA

Moreover, more than half of all the naval shore radio stations are located within navy yards and naval stations and with outlying marine corps detachments, under the immediate jurisdiction of the commandants or commanding officers.

It is obvious that the Post Office Department would require a very extensive organization in the field to cover this territory. At the present time the Post Office Department has no particular interests whatever in these outlying territories, whereas the navy has very particular interests and a complete field organization to meet its needs.

The army also has a few low power special stations in our outlying territories for military purposes in connection with the various army posts, but these special stations will always be required by the army for military purposes. Closer co-operation between the army and navy is possible to keep the number of these special stations at a minimum than would be possible with a civilian department such as the Post Office Department, as the army and navy sympathies and interests are similar.

OBSERVATION OF COMMERCIAL RADIO ACTIVITIES IN THE INTERESTS OF THE NATIONAL DEFENSE

(6) The radio art is just now in a state of transition and it is very necessary for the government to constantly watch the activities of the commercial interests and their development and relations with foreign interests. Should the Post Office Department take over the control of radio at this time it will require many years for this new department to become familiar with the ins and outs of radio practice and it will not be in a position to cope with the commercial interests until sufficient knowledge is obtained to do so, which will require years, and in the meantime the commercial interests will be at liberty to adjust matters to suit themselves. The navy keeps posted on radio developments in foreign countries through the offices of the naval attachés.

RADIO AIDS TO NAVIGATION DEPENDENT ON NAVAL TRANSMITTING STATIONS

(7) Sixty-two radio compass stations have been established on shore along our coasts within the past three years as aids to navigation.

These stations have been located at harbor entrances to guide ships into port during fogs and thick weather, and at strategical points along the coasts as aids to navigation and for military purposes.

The importance of this branch of the radio service is shown by the fact that 35 stations during the fiscal year 1921 furnished 53,344 radio bearings to 21,622 vessels.

Most of these shore compass stations (receiving) are tied into the coastal traffic stations for transmitting service. A few of them are so located that they have their own transmitters. Most of the compass stations, however, use the nearby naval coastal traffic stations transmitters, thus avoiding duplication of transmitting stations, quarters for housing the operators, etc. Experience has shown that operators having sea service are required for the efficient handling of navigational radio stations.

It is obvious that the Post Office Department would not be interested in these compass stations in any event, although the operation of the majority of them is dependent on the nearby coastal traffic stations.

LABOR

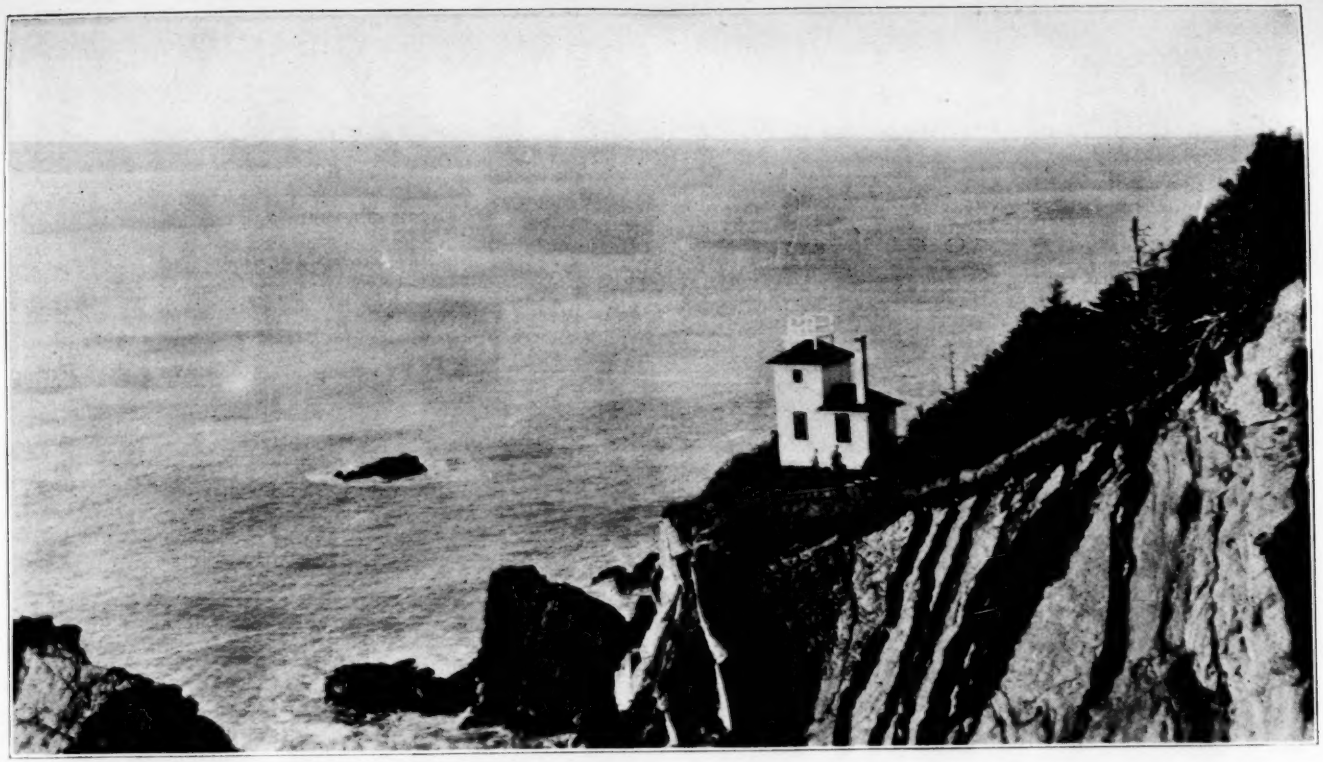
(8) If the coastal stations are manned by civilian personnel, it may be expected that these men will affiliate themselves with existing radio labor organizations with the consequent possibility of subsequent labor troubles in a service which is vital to the fleets and the merchant marine, not only in time of war but also during peace times.

CONTENTMENT OF NAVAL RADIO ENLISTED PERSONNEL

(9) It is generally conceded that a more intelligent class of enlisted men is required in the radio service than in other branches of the navy, and that these men be alert and absolutely reliable.

A large majority of navy radio operators are high school graduates. These men are given daily or periodical instructions in theory, operating procedure, naval radio tactics, etc., when off duty, both on shipboard and at shore stations and are kept informed of the latest developments in radio and sound.

The most deserving men in the fleets are given the privilege of two years duty on shore out of their enlistment of four years, and there are few operators who do not do their utmost to obtain



View of One of the Navy's Extremely Isolated Radio Compass Stations, Situated at Cape Hinchinbrook, Alaska

this privilege, particularly the married men. Aside from the hardships entailed, especially to men of long years of service, the inevitable result of the withdrawal of this privilege from the naval radio operators would be less intelligent and reliable men in the communication service of the navy with the consequent detriment to this important branch of the service.

It has been suggested that the Post Office Department has better facilities for distributing traffic to the public than has the Navy Department, that the Post Office Department can *mail* radio messages to destinations, etc.

The commercial telegraph and telephone land lines have always had connections to the naval coastal traffic stations and all traffic is relayed to and from the coastal traffic stations over these lines. The Post Office Department would simply follow this same procedure. The argument that the Post Office Department can *mail* radio traffic is valueless, as this same service is open to the navy for the extremely small percentage of traffic which is subject to delivery by mail. Incoming radio messages are invariably delivered to their destinations through the commercial telegraph and telephone companies' facilities.

There seems to be an impression that the army is duplicating the navy's work by maintaining and operating a costly shore station plant. This is not the case. The navy has a practically world-wide radio service—stations ranging in power from a few watts to the super-high power shore stations of 500 kilowatts power, and practically all of the army radio traffic, other than purely local military traffic, is handled over the navy circuits. The only exception to this is the army's chain of low power stations located in the interior of Alaska with the connecting military cable between Seattle, Washington, and Valdez, Alaska.

The army system, other than the Alaskan system, comprises essential low power stations located at various posts and portable field equipment for use with troops on the march. The army Alaskan stations are all located at army forts but this circuit is used to provide communications between the United States and the interior of Alaska in the absence of other means of communication. The other stations are used for local military purposes.

The navy can have no objections to the establishment and operation of shore radio stations by the Post Office Department in the interior for use in connection with their air mail service, provided these stations do not interfere with essential ship traffic. If these stations interfere with ship traffic then their retention is clearly unjustifiable, as the operation of the air mail service is not absolutely essential, whereas the operation of our navy and merchant marine is absolutely essential and the maintaining of communications with the ships at sea is equally essential.

The navy likewise can have no objections to the broadcasting of news by radio by the Bureau of Markets, or other similar unessential innovations provided this service does not interfere with the ships communication service, but it must be obvious that such additional services will inevitably increase the serious interferences in the already over-crowded radio field. Moreover, the inauguration of these various additional services simply means increased government expenditures and it is extremely doubtful if such services can be even moderately successful in the present stage of development of the radio art.

The navy stands ready to furnish such additional services as it may be desired to experiment with, through its existing stations, to such an extent as will not seriously interfere with the ship to shore service, and it has always advocated the use of its stations for the services of other government departments.

It is understood that the Post Office Department contemplates establishing radio stations in the interior to provide facilities for communication in competition with the existing land lines to some extent. The objections to this proposal from the viewpoint of interference, and in view of the fact that such a service is not essential, are indicated in the foregoing paragraphs.

As a matter of interest, in this connection, a very conservative estimate will be given covering the principal items in connection with the establishment, maintenance and operation of a medium power station with an effective range of approximately 350 miles. No estimate is given covering supervision and overhead.

2-200' Antenna supports (guyed pipe masts)	$ 5,000.00
1-2-KW Transmitter (arc)	3,000.00

Antenna and ground system	500.00	
Receiving apparatus	300.00	
Operating building	5,000.00	
Land	200.00	
Contingencies	500.00	$14,500.00
Maintenance—Light, heat, electric power, preservation of property, expendable supplies, etc.	$ 800.00	$ 800.00
4 Operators at $1,800.00 per annum	$ 7,200.00	$ 7,200.00
Total		$22,500.00

A comparison of the amount involved in connection with the number of stations contemplated and the tolls now being paid for the land line telegraph and telephone traffic will, it is believed, clearly indicate that such a proposed radio service would be uneconomical.

The navy has always advocated government ownership of the coastal radio stations with a view to lessening interference between stations as much as possible, both ship and shore, by having the control, administration and operation of all stations under one department of the government. This has not as yet been accomplished, however, due to the opposition of Congress, but it is believed this will eventually come about. Government ownership of radio stations in the interior would not appear to be necessary, provided regulation is exercised such that the uses of these stations are limited to those which will not interfere with the use of radio by ships at sea.

Marked improvements in the radio service are always the result of long and painstaking research, experimental and development work, and this work must be handled by skilled personnel of long experience. The naval radio organization has been consistently built up for the past twenty years and especially qualified officers, enlisted men and civilians have been engaged in the radio work of the navy in the particular interests of our fleets, with the result that today the naval communication service is foremost in many respects among the radio services of the world, and reliable service is available to the government between Washington and the Atlantic, Pacific and Asiatic fleets and their auxiliaries.

Any action which might result in the impairment of this service or retard its future development, either from the view-

point of general communications and the safety of life at sea, or as regards defensive and offensive naval tactics, would be unfortunate.

It is believed that any division in the control, administration, and operation of the coastal stations and the ships stations would inevitably lead to serious impairment of the service and also future developments in the radio art.

The conclusions of the Inter-Departmental Board of 1904, as approved by President Roosevelt, which read, in part, *"that the maintenance of a complete coastwise system of wireless telegraphy by the Navy Department is necessary for the efficient and economical management of the fleets of the United States in time of peace and their efficient maneuvering in time of war,"* are more applicable now than then as regards communications alone. Moreover, they are peculiarly applicable today as regards naval tactics and the broad question of the national defense as briefly outlined in the foregoing.

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THE SOUTH AMERICAN ALSACE-LORRAINE

By Lieut. J. M. Creighton, U. S. Navy

On the face of it, the League of Nations sounds like a very logical affair. You wonder why they don't get something done; why the "Questions" which come to its desks still remain questions. It is only when the details of the obstacles on the road to the solution of an irritation between two nations become apparent, when you consider the input of humiliation and anger and impotent fury, the crushed hopes and fruitless efforts, the burning resentment and sheer physical hurt which boil down in the closing days of a war into the residues of peace, that you appreciate how difficult a matter it is to smooth out some yet-remaining incident of a fight. War injuries do not die out quickly; they are too personal and too severe, and so the situation which remained at the close of the struggle between Chile on one side and Peru and Bolivia on the other during the years between 1879 and 1883, remains today the most unsettling circumstance in South America. It has lately been brought to the table of the League of Nations and the august members of that body have raised their hands in gestures of helplessness at the prospects of a solution.

The Tacna-Arica district is a barren, rainless section in the central west part of South America, shown on the map as the shaded portion.

Until 1883 this part of the coast belonged nominally to Peru. The district below it, containing the port of Antofogasta, was in the hands of Bolivia. The area was of such little importance that the question of the exact definition of the boundaries between the three countries which edged it—Chile, Peru, and Bolivia—had never arisen. There was nothing there to attract any of them, and so there was nothing to call their attention to

the details of the lines of division. The countries were new and the people were busy at home.

There is a certain impression abroad in the world today that people and nations have suddenly come to a detached, judicial frame of mind which allows them to see all things clearly and to make accurate and honest judgments of international affairs. This is more true than it used to be, in subjects which make no particular difference, but when the matter at stake is very valuable, the clear, impartial vision seems to become impaired, and as soon as it became evident that the nitrate fields in South America were

sources of great wealth, heated arguments arose concerning the possession of the country in which the fields lay.

Impartial historians say that the area was actually settled and the nitrate exploitations begun by private Chilean companies, though the district was understood to belong to Peru and Bolivia. It appears that the Chilean firms flourished to such an extent that the exports from their deposits began to impair the business of private Peruvian companies in other nitrate fields to the north, and the Peruvian Government was moved to place a heavy export tax on the outgoing goods of the Chilean firms for the purpose of assisting their own investors. Peru controlled the ports which the Chileans used and was able to do this, but the irritation occasioned by the taxation led to the breaking out of war in 1879. Bolivia joined Peru in the struggle and it was expected that the Allies would promptly dispose of their southern neighbor.

The conflict lasted four years and was of a most desperate and bloody character. The intimate history of the affair reveals that the battles were not characterized by much staff skill or maneuvering, but the courage and tenacity of the troops on both sides was beyond question. The Allies moved their forces to the south and the Chileans advanced to meet them. The war on land favored the latter, and their success was materially assisted by their victories on the sea.

Bolivia had no navy and the Chilean sea forces were slightly superior to those of the Peruvians, especially in the matter of iron-clads. Three sea encounters reduced the Peruvians to the condition in which there were only two small coast-defense gunboats to protect Callao. With the practical obliteration of the enemy's navy, Chilean transports now moved north along the coast and interposed their troops between Lima and the main Peruvian forces in the south. In the last year of the war they landed an army at Callao and advanced on the capital. The story of the defense of this city is a duplication of the tales of the fury, and desperation, and determination with which the Flemish cities were protected against the Duke of Alva. Old men, women and children were pressed into the ranks of the defenders. The death tolls on both sides were very heavy, but the Chileans finally broke through.

The victors stayed in the capital for a matter of six months while the terms of the treaty of peace were being dictated and signed, and the memory of those days, and the humiliation and pain which the defeats of the war engendered, are still very lively in the countries which were concerned.

As a result of the war Chile took the port of Antofogasta and the whole province back of it from Bolivia, and the Tacna-Arica district from Peru. Both countries thus lost areas of the greatest value, which have since enriched Chile. Bolivia, as the map will indicate, was completely cut off from the sea.

The Treaty of Ancon terminated the conflict between Chile and Peru. One provision of that document was that a plebiscite was to be held in the Tacna-Arica district ten years after the signing of the treaty; that is, in 1893. But 1893 has come and gone and so have a great many years since. The plebiscite has never been held. Each country demanded such conditions and circumstances for the elections that the other has refused to acquiesce and the province remains in the hands of Chile. Bolivia's treaty with the victors was not actually signed until 1904. Until that time, no Bolivian government would agree to the definite transfer of the area concerned, and Chile merely stayed there in possession. In 1904, however, Bolivia signed a treaty, definitely transferring the Antofogasta district to Chile.

The return of the nitrate fields is the kernel of Peruvian foreign policy and it may properly be said to be as prominent an affair for Bolivia. Chilean diplomacy, or circumstances, or time, have alienated Bolivia from the old alliance with Peru and this has led to a great bitterness between the former partners in the war. Peru has steadily maintained that the Treaty of Ancon is to be held as determining the condition of Tacna-Arica; that is, that it is open to plebiscite. She counted on Bolivian support in this attitude but Bolivia has apparently adopted the idea that this territory is firmly in the hands of Chile, that it will not be got away from her, and that the best business she can do is to arrange some sort of an agreement with that country.

The map shows that from La Paz, a railroad runs to Arica through the city of Tacna and that another, much less direct, encircles two large lakes in Bolivia and finally comes out at Antofogasta. Both these ports, of course, are now controlled by Chile,

and past governments of Bolivia have endeavored to arrange a direct agreement with the Chileans for the export of Bolivian merchandise through these two rail-heads.

The matter was brought to a dangerous point when the League of Nations met last autumn in Geneva. The Bolivian delegation requested that the matter of the revision of their treaty of 1904 be placed upon the agenda for discussion. They drew attention to the fact that every country has found it essential to its progress to have unimpeded access to the world's markets, and that the treaty of 1904 left them isolated from the sea. On this economic basis they requested that the League of Nations take up the matter of a revision of the treaty with Chile so as to give them a seaport. Past governments in Bolivia have endeavored to have the Chileans cede them the Tacna-Arica district, and this endeavor to secure land which was originally Peruvian was one of the causes of the severe ill feeling between Bolivia and Peru which is said to exist. The present government in Bolivia, however, abandoned the effort to secure Tacna-Arica from Chile and has shifted its desires to Antofogasta again.

The Bolivian request to the League of Nations immediately led to a dramatic succession of events. The Chilean delegation announced that if the matter were discussed by the League they would promptly withdraw and go home. Following this declaration, the Bolivians issued a statement to the effect that if the matter were *not* taken up *they* would withdraw from the Conference and go home. In this quandary, the League decided to refer the matter to a special commission with the duty of reporting whether or not the League of Nations was in a position to decide the affair. The matter stayed in this shape until the fifteenth of September. On that date it was announced that the Bolivians had withdrawn their demand, and once more this dangerous question seemed carried over into the future.

December, 1921, however, saw the exchange of a perfect flurry of notes between Peru and Chile on the subject of the disputed provinces. Feeling rose to fever heat. Motions were made in each of the countries, favoring ejection of the Nationals of the other. It was reported that Peru had listed all Chileans among the undesirables to whom admission to the country was to be denied, and rumors came of armed clashes on the frontier.

At the height of the tension the Bolivian government interfered to say that it must be considered in any negotiations concerning the Pacific seaboard, but the following day saw a prompt Chilean note delivered in La Paz, calling attention to the fact that the present questions in no way concerned Bolivia, and that all matters between Bolivia and Chile had been settled definitely in 1904.

On Christmas day the Peruvian government dispatched a friendly note to La Paz, offering to co-operate with Bolivia to bring about subsequent negotiations between that country and Chile, provided the Tacna-Arica matter were settled to Peruvian satisfaction.

The dispute was brought into the highroad toward solution on the 20th of January, when Chile and Peru accepted the invitation of the United States to send their representatives to Washington, and the Pan-American building will be hardly cleared of the Limitation of Arms delegates when those from the disturbed sections of the South sit down in the attempt to remove this long-standing irritation.

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THE VITAL IMPORTANCE OF RADIO COMMUNICATION IN MODERN NAVAL WARFARE

By Lieutenant Harry F. Breckel, U. S. N. R. F. 2

The successful carrying out of modern naval warfare is, in the main, entirely dependent upon the art of radio communication. A broad statement perhaps, but nevertheless, one that the writer feels is justified.

The many lessons handed down to us by careful study of the past wars, serve to emphasize the fact that the successful execution of any strategical plan involving a combatant force spread over a wide area, is dependent on the maintenance of reliable communication between the different units comprising the force. THEREFORE THE NECESSITY AND IMPORTANCE OF DEVELOPING AND MAINTAINING A LOYAL, EFFICIENT, RADIO COMMUNICATION SERVICE SHOULD NOT BE UNDERESTIMATED.

The successful functioning of a radio communication service is, of course, based on the efficiency and ability of the men at its head, but too much stress cannot be laid on the necessity for having loyal, competent, enlisted personnel conduct the operation of the various radio stations, both ship and shore.

There can be no doubt as to the superiority of American naval radio equipment over that employed by foreign navies and in this regard we need have no concern whatever. The fact that the United States (and particularly the American navy) is farther advanced in this art is largely due to the extensive research work carried out in this country, fostered, to a great extent, by the Navy Department. American inventive ability has also been exercised to the fullest extent by the insistent demand by the navy for radio apparatus of efficient design. The fact that the radio telephone is today a practical device, is largely due to experimental

and research work either carried out, or fostered, by the Navy Department. As early as the year 1915 the navy was conducting practical tests with radio telephone equipment, and the writer recalls clearly hearing the human voice transmitted via radio, between an American man o' war and a naval radio shore station, in that year.

There can be no doubt but what the individual responsibility borne by the naval radio operator is far greater than that shared by the enlisted personnel of other branches of the service, for much depends upon his efficient performance of the duties of his rating. Higher officials of the service, such as those in charge of the various bureaus, admirals of fleets or squadrons, commanding officers of the hundreds of vessels comprising the navy and many other officers in important positions, all are more or less dependent on the loyalty and ability of the naval radio operator to efficiently discharge his duties, for in these days of divided forces the successful working of the entire service depends upon perfect coordination between the units comprising it, which end can only be attained through the medium of a thoroughly efficient and reliable communication service.

Innumerable instances could be cited to show where, during the late war, dispatches of extreme if not vital importance, were entrusted to the enlisted radio operator and which, if they had failed to reach their destination, might have caused disaster or delay. The entire convoy system which proved so effective, the safety of the vessels at sea, the rescue of survivors of sunken vessels, the warning of vessels at sea to avoid certain areas, the general broadcasting of important information concerning mined areas, etc., the transmission of important dispatches between Washington and the military commanders in Europe, all depended on the efficient performance of the naval radio communcation service, the successful operation of which hinged entirely on the loyalty and efficiency of the personnel actually carrying out the practical working details at the different stations, both ship and shore. These facts all serve to show that THE RELIABILITY AND EFFICIENCY OF A NAVAL RADIO COMMUNICATION SERVICE CAN BE NO GREATER THAN THAT OF THE INDIVIDUAL OPERATORS ACTUALLY CARRYING OUT TRANSMISSION AND RECEPTION, REGARDLESS

OF HOW EFFICIENT THE VARIOUS OFFICERS COMPRISING ITS HEAD MAY BE. It can easily be seen that the necessity for having LOYAL and WELL-TRAINED personnel in this branch of the naval service is of paramount importance.

Above all, it should be realized that inefficiency or disloyalty in a naval radio communication service is a condition which should not be allowed to exist and which, if it did exist, would, under certain conditions, jeopardize an entire fleet. Therefore more than ordinary care should be exercised in selecting its personnel. It should be borne in mind that an inefficient or disloyal radio operator is in position to work untold harm, and in the case of the disloyal man it might be stated that there are ways in which he could accomplish his end and still avoid suspicion or detection. By way of example let us assume that a state of war exists. An admiral of a fleet has received a supposedly authentic report from some reliable source to the effect that an enemy force of a certain strength has proceeded to carry out an attack on a certain city on the coast. He has reached a decision that it will be necessary to intercept the enemy force and engage it with a view to destroying same and he, therefore, has dispatched a force of similar character but of superior strength to do so. His force has proceeded to carry out his orders and is now several hundred miles at sea. Suddenly he receives another report to the effect that the enemy force is far stronger than the first report stated. The situation is now such that it is too late to increase the strength of his force to match that of the enemy's and that in all probability his force would be annihilated if allowed to engage in battle. There is, however, still available time in which he can recall his force. What does he do? The only way that he can get word to his force in time is by means of the radio, therefore he issues orders to his communication officer to transmit a dispatch telling the commanding officer of the force in question to proceed to such and such a rendezvous where he will receive reenforcements, after which he can proceed to engage the enemy, if this proceeding be possible, with some degree of assurance that the operation will be successful. Now after coding the dispatch for transmission the communication officer *turns same over to the radio operator for transmission*. It is more than likely that the radio operator is

aware that a certain force has been dispatched, for in the majority of cases he will have been notified to keep a sharp lookout for radio signals from it. Also it may be possible that the enemy force has been using his radio and perhaps, due to increasing signal strength, etc., the radio operator is sure that it is headed toward, or getting closer to, his station. Summing up the general situation he feels sure that an enemy force is moving to attack somewhere, but where of course he cannot say. With the aid of the radio compass, however, it is possible that he may have determined that the enemy was proceeding in a certain direction and that in all probability the force which left some hours previous was dispatched for the purpose of intercepting him. If this operator should happen to be disloyal and should garble the message in transmission by failing to properly space his code characters, or leave out say the first code group WHICH IN PRACTICALLY ALL CODES IS THE KEY TO THE CIPHER USED, or fail to use sufficient power to "raise" the operator on watch at the station being called or in some other way cause the dispatch to fail to reach its destination entirely, the force which it was intended to warn might unwittingly engage an enemy of far superior strength and go down in defeat. It might be argued that the force would have out a scouting line to further insure protection. Granted, but as a rule we are also dependent on the radio for the receipt of information from our scouting line and a similar condition of disloyalty or inefficiency might exist here also. It might also happen that an enemy submarine would be successful in disposing of the only scout in a position to sight the enemy, long before visible contact had been made and many other conditions could arise, whereby it would be impossible for the force to evade an engagement. Now let us assume that the operator transmitting was a loyal, efficient man and that the message was sent in proper form. It may be that the receiving operator is not loyal or is inefficient, in which case the same situation might arise. In my mind too much importance cannot be attached to having tried and true operators in the naval communication service; for much depends upon their reliable performance of duty. There can be no doubt but that the successful accomplishment of our ends during the late war was largely due to the use we made of the art of radio and

a little foresight cannot fail to convey the fact that we will be even more dependent on radio in any future conflict. With the addition of air craft to our fleets for spotting, scouting, offensive or defensive work; with seagoing submarines attached to the fleet equipped so that radio communication with them is possible even though they are submerged; with possibilities of employing radio controlled torpedoes or battleships far from being a vague supposition; with practical navigation of aircraft and vessels by radio not far off, it cannot but be apparent that the art of radio is becoming more and more every day a vital factor in carrying out naval warfare.

In short, so much will be required of the naval communication service in any future war that a great deal of thought should be given toward the careful training of the communication officers and the enlisted operators in direct supervision of the operation details at the different stations. The officers at the head of the naval communication service will no doubt, as they are now, be officers of the line who have had broad experience in all matters naval and who will fully realize the importance to the service of an efficient communication system. Therefore the main problem resolves itself into one of having communication officers and enlisted personnel entirely capable of carrying out the details connected with the organization. During the period of time that the writer served with the Atlantic fleet as a radio operator it was customary to detail officers who had but recently graduated from the Academy, as communication officers on board the different vessels. In some cases these officers had a fair knowledge of matters radio but in the majority of cases they knew little or nothing about it for the reason that they did not study the art sufficiently to enable them to efficiently handle the practical operation of a station. In so far as the handling of the different codes and ciphers were concerned their efficiency was excellent, but when it came to the examination of personnel for advancement in rating, or the actual standing of a watch, or the manipulation of the instruments, or further, to the actual repairing of apparatus which was out of order, these were details which, due to lack of practical experience, they were unable, in most cases, to carry out and dependence had to be placed on the ability of the chief petty officers who, with their broad practical experience

were able to do so. This system worked well even under this apparent handicap, and in many instances within a year's time communication officers who had taken charge of a station with no previous practical experience had become proficient operators and were able to take over the practical operation of the radio equipment. However, in many cases the officer would have many additional duties to perform in which he, due to natural inclination, would take greater interest, with a result that his proficiency as regards matters radio was not as great as it would have been if he had been enabled to follow them entirely. Further, it is believed that at the time not enough importance was attached to matters radio on board ship to provide an incentive for commissioned officers to promote their efficiency in this branch. In the main it might be stated that the subject of radio simply aroused curiosity rather than genuine serious interest as in the case of matters pertaining to ordnance or other subjects dear to the heart of all naval men. The time has arrived, however, when the question of "Radio Efficiency" should be studied with the same tense interest as the subject of "Battle Efficiency," for unquestionably the "Battle Efficiency" of a modern fleet is vitally dependent on the efficiency and reliability of its radio communication service. Knowing this, we should act accordingly. We should have radio communication officers attached to the different units comprising the fleet and also in charge of the numerous important high-powered naval shore stations who are not only interested in the art of radio communication, but who have taken up the study of same and who are conversant with the theoretical principles pertaining to it. These officers should be given an incentive to remain in this branch of the service as long as possible and means for promotion should be provided which would permit of their advancement in rank on a basis equal to that of their classmates serving in the various branches of the line. They should also take up the study of the divers communication methods employed by ALL foreign navies and more especially those of potential enemies; they should be thoroughly conversant with the character of the codes used by the radio operators transmitting so that the radio personnel under them can be thoroughly instructed in the reception of same in order that all enemy communications, in the event of war, could be correctly intercepted for the information

of the commanding officers, or for the Naval Intelligence Bureau. For example, during the early period of the late war a large number of our naval radio operators were not familiar with the so-called "prime" letters used so extensively by the operators comprising the personnel of the Allied and enemy radio forces and for the time being they were unable to intelligently copy all communications heard. Of course it did not take them long to master these new code characters but it would have been much better if they had known them in advance. Further, the communication officer should be in a position to instruct his force intelligently as regards the different systems of communication employed by foreign navies and as far as possible we should have several communication officers who are not only familiar with the various codes employed by foreign operators, but who are also familiar with the various languages. The study of foreign languages by the radio personnel should also be encouraged. Especial attention should be given the various methods of communication used by any potential enemy, with a view to working out details in regard to either maintaining deliberate interference during battle and "jamming" his operators, or determining the best method for getting our communications through without serious interruption. By careful observation it can easily be determined just how many different wave lengths the enemy has available and steps can be taken to interfere on ALL of them with a view to preventing him from getting his communications through. Further, as a rule a flagship does the most transmitting and a careful, observing operator can soon determine simply by the amount of radio traffic transmitted that the particular station in question is an important one and that steps should be taken to pay particular attention to copying all communications transmitted by it, or, if deemed necessary, that means be taken to create interference with his transmissions if possible. An observing operator can also determine by the amount of radio activity going on in an enemy fleet that some unusual activity is taking place or pending. Further, he can easily identify certain vessels after having heard them transmitting radio signals a number of times, in certain cases. Sometimes a station will have a "spark" of a peculiar tone frequency, or there may be a certain operator attached to it who has a certain characteristic way of handling his traffic, and by remembering these

details an efficient radio operator can readily identify this vessel in the future when it is heard transmitting, regardless of whether a call sign is used or not. Perhaps one of the most easily "identified" vessels attached to the American navy was the U. S. S. *Birmingham,* which vessel had a very peculiar sounding "spark" which differed greatly from that of the average vessel. During a war game in 1916 the *Birmingham* was readily "singled out" and identified in spite of the fact that bogus calls were used to prevent it. Also I might add that the writer, during the late war, copied signals from the *Birmingham,* which vessel at the time was serving in waters adjacent to the Mediterranean Sea, and was able to identify her instantly in spite of the fact that he did not previously know she was in European waters. This possibility of identifying vessels can easily be eliminated through the use of arc or tube transmitting systems which are far more efficient and have practically the same "tone frequency," thus making it practically impossible to identify vessels as mentioned above. Radio officers should be qualified to instruct their personnel in regard to the numerous conditions which might arise during the practical operation of a radio station on board ship during wartime. Another essential feature that he should pay particular attention to is the necessity for having competent operators attached to his force who are capable of copying code signals at high speed. It is often possible to prevent an enemy from copying your communications if high speed is employed by the operators in transmitting the code characters. For example, during the late war the enemy was noted for the operating efficiency of the radio personnel; invariably his communications went through at top speed and without waste of time and I recall several instances where our operators were unable to copy his messages because of their inability to copy at high speed. These operators were of course in most cases men who lacked experience, but nevertheless it will be seen that the ability of operators to copy any other operator regardless of his speed is essential, to say the least. Also it might not be unwise to change the dot and dash code characters used by the operators at times for this would be disconcerting to enemy operators trying to intercept our signals, to say the least, for in practically all cases he would be familiar with only the standard code characters generally used and would be utterly un-

prepared for any change with a result that our communications would get through without having been intercepted. There are many details such as these which could be studied and worked out by a communication officer fully interested in the work and proper instruction in regard to same be conveyed to the personnel under his command, with a resultant increase in the state of efficiency of the force. Further, a system of drills could be devised simulating actual battle conditions for the purpose of instructing the personnel as regards the effecting of quick emergency repairs, the clearing away of radio antennae which have been shot away and the rapid erecting of emergency auxiliary antennae to take their place. In short, there are so many details to be taken into consideration by a communication officer besides the maze of instructions relating to fleet traffic, the changing of codes and ciphers and other routine duties, that to give proper attention to same will, without doubt, occupy his entire time. Therefore it seems only proper that an officer having this duty should not be encumbered with additional duties. Of course it may be stated that radio gunners are available to take care of the majority of the mass of detail. Granted, but we should have competent commissioned officers in charge of the Radio Department who are also fully familiar with all its workings as in the case of other departments. With officers in charge of the practical operations as well as the various executive duties it is believed that a general increase in all-round efficiency will undoubtedly result. Due to his superior education various advantages and disadvantages can be more carefully weighed and proper steps taken and he will no doubt often take into careful consideration smaller details of importance which in many cases are overlooked by men charged only with the practical operation of a station. Also, officers who are familiar with the general principles of radio and who have observed the station's operation at first-hand, may be able to devise or invent valuable additions to its equipment, which may further improve its efficiency in battle.

Another angle of great importance which should receive careful attention, is the training of adequate reserve personnel, for in time of war a large number would be required for immediate service. The navy is fortunate in this respect in having available splendid material for this purpose. There are hundreds of thou-

sands of amateur radio operators scattered throughout the nation who with a brief period of training would eventually develop into efficient operators. As a rule the average amateur is more or less familiar with the constructional details of practical radio equipment and the majority of them are proficient in handling the code in a more or less efficient manner, but all of them have a general foundation as regards matters radio which could readily be built up. To provide for the enrolling of the more efficient amateurs in the reserve force, it is believed that the appointment on the staff of the various state reserve force commanders, of radio communication officers to take care of the details of this work, is a desirable feature. In some cases former communication officers are actively engaged in radio research work, or the manufacture of radio equipment, or have taken up amateur radio as a hobby, in which case they are more or less in direct touch with the amateurs in their state and know who are the most desirable for naval purposes. Such officers who are still affiliated with the reserve force, would, no doubt, take up the work of training an adequate reserve radio personnel with a great deal of interest, if not absolute enthusiasm. Many interesting details, such as a chain of naval reserve force radio stations, operated by reserve personnel, for handling the communications of the reserve force commanders, code classes, theory classes, radio drills, etc., etc., could be worked out and put into practice and judging from the writer's personal experience in handling the problems relating to amateur radio during the past two years, it would become necessary to stop enrolling additional recruits, for the American radio amateur is unquestionably a most enthusiastic individual and one can "listen in" almost any hour of the day and night and hear any number of amateur stations "hamming." The average amateur will, with proper training, undoubtedly develop into an ideal naval radio operator, and steps should be taken to sift out the more desirable material for enrollment in the naval reserve force, after which proper intensive training could be provided so that in the event of a national emergency an efficient, reliable radio reserve could be called to the colors, who would be available for instant service.

The writer has read with a great deal of interest the timely article written by Lieutenant (jg) H. D. Kent, U. S. Navy, in

the July, 1921, issue of the UNITED STATES NAVAL INSTITUTE PROCEEDINGS and can but agree with him when he states the necessity for having a Communication College for the Training of Radio Communication Officers in the art of radio communications and radio strategy, for much will depend on our having an efficient, organized radio communication service in any future conflict, capable of "going the enemy one better."

In conclusion, might I even go so far as to state that under certain battle conditions, the fleet with the most highly developed communication service will in most cases obtain a decision over the one possessing an inferior radio servce?

(Nothing in the article I have written should be construed to cast reflection in any manner whatsoever on the radio communication service, its personnel or the officers attached thereto, for this article was solely written with a view to setting forth the important part that radio will play in any future conflict between the United States navy and a foreign power, and also to set forth certain facts which the writer observed during his service as a radio communication officer during the period of his service with the regular navy.)

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

RELATIVITY

By Lieutenant H. K. Lyle, U. S. N.

In the past year considerable publicity has been given to the discoveries of Dr. Albert Einstein. His work has been of great importance in the scientific world but it is impossible to have an accurate understanding of his theories without a fair degree of mental application. This article is an attempt to set forth Dr. Einstein's work in non-technical language omitting the mathematical side as far as possible.

The Theory of Relativity is advanced as an underlying law of nature which covers all phenomena whether astronomical, optical, dynamic or electro-magnetic. In other words, all of these phenomena possess some similar qualities and are related closely to each other.

Heretofore time has been considered as an abstract quantity but a development of this theory of relativity will show that it is intimately connected with natural phenomena so that it can no longer be considered as a thing apart but more in the nature of a fourth dimension or factor in locating any event.

At present our basis of classical mechanics lies in the laws of Newton and the geometry of Euclid. Both have proved eminently satisfactory for practical engineering and it seems that they must be so firmly established that their position is unassailable. However, it has been definitely known for many years that these laws do not account for every phenomenon which has been observed. Sir Isaac Newton himself was aware of some of the deficiencies and tried without success to surmount them.

The Theory of Relativity has come to the aid of modern physicists and explained some of these events, such as the advance of the perihelion of Mercury. As a result, it has more or less stated the limitations of Newton's laws and geometry as we have used it.

The reasoning of Dr. Einstein is directed at first principles, and definitions will be necessary at this point so that we may have a complete understanding of later arguments.

The first point in any problem is the necessity of locating any event in space. We do so by means of a "system of coordinates" which may be referred to as a "sphere of motion" or "system."

The "Cartesian system of coordinates" consists of the length of three perpendiculars from the point in question to the three mutually perpendicular planes which compose the frame of reference. The word "length" in this case means that a measuring rod, "L," has been laid along these perpendiculars a certain number of times and this number expresses length in terms of the unit "L." It assumes that the rod "L" does not change during the complete operation.

A system which is sufficiently far removed from all outside influence so that "a body in motion continues that motion in a straight line" is called a "Galileian system."

A "Gaussian system" is one in which an event is located arbitrarily. This system will be fully explained later.

Let us now consider two Galileian systems K and K′ where K′ has uniform motion in a straight line without rotation with respect to K. The Special or Restricted Theory of Relativity is expressed thus: "Natural phenomena run their course with respect to K′ and according to the same general laws as with respect to K."[1]

Take as an example a train moving along a straight track at a constant speed. Natural events may be observed from both systems, that is, from the train and from the embankment alongside the tracks. Suppose the train is running in a vacuum and a stone is dropped from the window. The observer on the train sees it fall in a straight line while the other sees a parabolic curve. The stone only described one path but both observers are correct. Since they were in different frames of motion, this event appeared differently to each.

Notwithstanding this different appearance all equations having to do with the passage of the stone along its trajectory have the same form and the coordinates for one system can be obtained

[1] *Relativity, the Special and General Theory.*—By Dr. Albert Einstein, p. 15.

by applying certain equations to the corresponding coordinate of the other system. These equations are known as the Lorentz Transformation.

These transformations are the result of investigations to solve the apparent incompatibility of the constancy of the velocity of light in vacuo and the principle of relativity. The solution resulted in a new conception of time.

It was found that time could no longer be considered as an abstract quantity but that it has a very definite relation to natural phenomena and is directly affected by the state of motion of the clock. Briefly, the result is this. Let us consider two clocks of similar construction which have exactly the same rate. We place one of these clocks on the moving train and the other on the embankment. Their rates will now vary slightly. The clock in motion will be slower and the greater the speed of the train the greater the difference.

This discovery permits the retention of both the law of propagation of light and the principle of relativity.

Investigation along these lines also brought out new ideas of measurements. A measuring rod "L" may be used to determine the length of our train by applying to the rails between the points where the front and rear may be observed at any given instant. The same rod may also be applied to the train itself. According to the principle of relativity we shall not obtain the same answer because the measuring rod undergoes a slight contraction relative to the embankment as a result of the motion of the train.

These statements are evolved after extensive mathematical work which is outside the scope of this article. Therefore, I must ask the reader to accept them without thorough explanation.

The preceding conclusions bring us to believe that Shakespeare was right when he wrote, "All that glitters is not gold." Phenomena have different appearances to observers placed in different frames of motion.

This statement will be readily understood by consideration of our moving train once more. Suppose two events occur simultaneously at two widely separated points along the track, A and B. Since our conception of time has been revised, we must define the word "simultaneous" thus:

Track .....A.....M.....B.....
..... | ..... | ..... | ..... Train

An observer situated at M, a point equidistant from A and B, is provided with mirrors so that he may observe both. Light with its constant velocity will take the same interval of time to traverse AM or BM. Therefore if the events which occurred at A and B are observed at M at the same instant, they will be "simultaneous."

But if another observer with similar mirrors is moving on the train in the direction AB the ray of light from A must overtake him while that from B is approaching him and obviously they will not reach him at the same instant. In short, the so-called "simultaneous" events do not appear so to the moving observer because of his motion with respect to the embankment.

All of these examples are formulated under the Special or Restricted Theory of Relativity where the relative motion of one system with respect to the other is limited to a uniform motion in a straight line. It is clear that all motion uniform or accelerated in a straight line or rotation has some effect which cannot be ignored. There are other influences also, such as gravitation, that may not be disregarded. It has been shown that one kind of motion causes a variation in the behavior of measuring rods and clocks. These variations render the Cartesian system of coordinates inadequate for the statement of the General Theory of Relativity.

To overcome this difficulty, Gauss invented a system of coordinates which bears his name. Suppose we have under consideration a surface or two dimensional continuum. This surface is covered with an infinitely large number of arbitrary curves so arranged that two and only two of these curves pass through every point of the continuum. A number is assigned to each curve so that any point may be located by giving the numbers of the curves which intersect there. For continua of more than two dimensions additional curves are used so that each point is the intersection of as many curves as the continuum has dimensions. This Gaussian system is a generalization of the Cartesian system and by virtue of its arbitrary construction effectually overcomes the disadvantages of the Cartesian coordinates.

The General Theory of Relativity may be stated as follows: "All Gaussian coordinate systems are equivalent for the formulation of general laws of nature." [2]

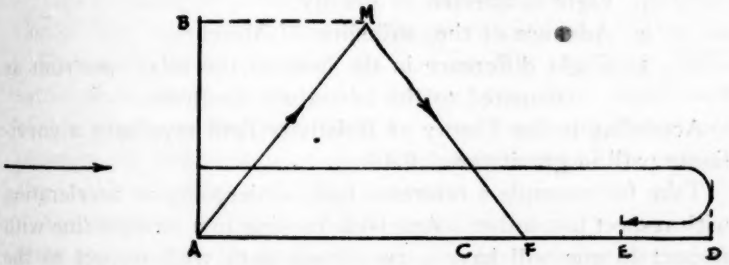
[2] *Relativity, the Special and General Theory.*—By Dr. Albert Einstein, p. 115.

The most interesting part of any study of the theory of relativity lies in the experimental work which supports its results. Because of the infinitesimal intervals of time and distance to be measured, there are only a few of these experiments possible.

According to the principle, it is impossible to detect any motion of the earth with respect to the ether which we regard as space. In other words, by no experiment, optical or dynamic, are we able to determine absolute motion.

Professors Michelson and Morley conducted a series of experiments which, disregarding relativity, should have shown the existence of this ether drift.

Their method may be seen from a consideration of the following example:



A is a source of light, B and C are mirrors 186,000 miles distant from A, AB is perpendicular to AC. All three points are rigidly connected and the entire system is moving along AC at half the velocity of light, 93,000 miles per second.

If the system were at rest, a ray of light released at A would require two seconds to reach B or C and return to A. But because of the indicated motion light will require two seconds to overtake C at D and 2/3 of a second more to return meeting A at some point E making a total of 2.667 seconds.

The ray traveling to B would reach it at some point M requiring $2/\sqrt{3}$ seconds and returning in the same time would meet A at some point F, making a total of $4/\sqrt{3}$ or 2.309 seconds. The difference is quite perceptible.

If now we fix our mirrors on the surface of the earth and one path of light be along the direction of the ether drift, we should be able to detect this drift or motion of the ether with respect to the earth by this different return of the rays.

In the actual experiments the mirrors were only a few feet apart and the time interval to be measured only about one quadrillionth of a second but the apparatus employed could detect this interval. But in every case the two rays returned in exactly the same length of time.

The Theory of Relativity explains the failure very easily. Our time intervals are all relative to that imaginary fixed point in space. The mirror system is shortened along AC with respect to a system of coordinates attached to this point in such a manner that the experiment results in failure. Since Relativity and this result agree, we have one argument in support of the theory.

Three positive confirmations are required for the retention of the Principle. They are:

1. Light is affected by gravity.
2. Advance of the perihelion of Mercury.
3. Slight difference in the lines of the solar spectrum as compared to the laboratory spectrum.

According to the Theory of Relatjvity light rays have a curvilinear path in gravitational fields.

Take for example a reference body undergoing an acceleration with respect to another. Any body moving in a straight line with respect to one will have a curvilinear path with respect to the other. Rays of light will come under this principle.

Now consider an observer in a large chest free from all gravitational influences. Newton's law of motion holds absolutely within the chest. But if a constant force be directed up from an outside source, the chest will undergo a constant acceleration.

At first the observer had nothing to hold him to the floor of his chest and the slightest pressure on the floor caused him to float upward. But as the chest is accelerated he notices a downward pressure which must be accounted for. If he knows of gravitational fields and is unaware of his acceleration, he will come to the conclusion that he is in a gravitational field and may carry out various experiments to substantiate his theory. These experiments will run their course in exactly the same manner as if his theory were correct.

Therefore we conclude that an acceleration affects natural phenomena in the same way as gravitation. It is impossible for this observer to tell the difference, because he cannot detect the

absolute motion of his chest. Suppose yourself in a train with another standing on the next track. Very often you become aware of a relative motion but until you feel a jar or look at the ground, you cannot tell which train is moving.

To go back, if one reference body be undergoing an acceleration with respect to another, light rays which travel in a straight line with respect to first will travel in a curved line with respect to the second. If an observer on the reference body undergoing the acceleration is unable to distinguish between this acceleration and a possible gravitational field, we may conclude that the light rays will be affected by gravitational force just as they are by the acceleration. In short, light travels in a curvilinear path when under the influence of gravity.

This postulate of Relativity was proved conclusively by observation of light rays passing through the gravitational field of the sun.

During the total eclipse of the sun on May 29, 1919, British astronomers took photographs showing the stars which were visible nearly in line with the sun. Several months later more photographs were taken of the same stars only at this time the sun was in another part of the heavens.

As compared to the second observation the stars on the first plate appeared to be displaced outward from the center of the sun. The calculated curvature of these light rays was only 1.7 seconds of arc and the photographic results coincided very closely with the displacement which would be caused by this figure. The discrepancies in each case were in such a direction as to show more rather than less curvature so that this point is confirmed beyond any doubt.

It has been known for some years that the perihelion of Mercury has been advancing along its orbit at a rate of 43 seconds of arc per century. According to Newton's laws the perihelion of all the planets should remain stationary with respect to the sun.

Calculation under the Theory of Relativity shows that the perihelion of each planet should revolve slowly about the sun and that in the case of Mercury this rotation should be exactly 43 seconds of arc per century.

In the case of the other planets, this advance is too small to be observed with our present means. This difficulty is increased by the fact that Venus, which is next to Mercury in proximity to the

sun, travels in an orbit which is nearly a perfect circle and its perihelion is correspondingly difficult to locate exactly.

The last point to be confirmed arises from the statement that the frequency of light waves is dependent on the intensity of the gravitational field in which the source is situated.

As the earth is smaller than the sun, the difference should be detected by a comparison of a spectrum from each source. It manifests itself by a deflection of the lines toward the red in the solar spectrum compared to a laboratory spectrum.

The difference in frequency only amounts to about two millionths of a wave length so it is difficult to measure. However, scientists in various parts of the globe have detected the difference so that it is almost beyond any question of doubt. There are some investigators who have failed to get this result and so this point is still the subject of some dispute.

Taken all in all the results of these experiments are sufficient to establish the Theory of Relativity as a law of nature. The laws of Newton become close approximations when the Principle of Relativity is accepted. His work, like that of Euclid, requires certain conditions which are realized. The reasoning of Euclid which seems so logical and unassailable to the school-boy is correct but as we cannot in practice be sure that a distance measured in one direction is equal to one measured at right angles to it, we are not justified in accepting the various hypotheses of geometry as practical facts from a truly scientific standard.

Geometry then is not an exact science of natural phenomena but as a close approximation it will suffice as a base for mathematics.

The Principle of Relativity gives us a more correct understanding of the laws governing the phenomena of the universe but as it differs only very minutely from our present understanding, our everyday mathematics will not be affected.

As far as popular opinion goes, the greatest result will be the acknowledgement that Dr. Einstein is the greatest physicist of the age, if not of all time.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

PRINCIPLES OF COMMAND

By Rear Admiral Lloyd H. Chandler, U. S. Navy

Knowledge of the Principles of Higher Command

HIGHER COMMAND

By the expression *higher command* the present writer understands is meant the larger activities pertaining to the duties of a commander-in-chief or of other officers still higher in military authority, but it is difficult to make an exact differentiation and state definitely just what activities pertain to *higher* and what to ordinary command. Beyond a doubt, however, the creation of broad general plans: strategic, tactical, administrative, of organization, etc., are attributes of higher command. Perhaps an understandable rough dividing line may be indicated by saying that such general plans are comprised within the functions of the higher command as are created and as a whole retained by the officer creating them and by his superiors in office; portions and details only being transmitted to subordinates from time to time, and perhaps in different form, as it becomes necessary for such subordinates to carry them out. Again, it may be said that the functions of higher command are those which have no counterpart within the sphere of the subordinate; such, for instance, as the organization of a fleet composed of forces of different types, or as the making of strategic plans for a campaign or tactical plans for a battle. The definition is far from perfect, however, for while the commander of a battleship force, for example, has no problem of organizing a fleet composed of different types, still he has, or should have, a large voice in organizing a force of ships of the same type into administrative and tactical units, etc.; a task not essentially dissimilar in principle from that of his senior. Similarly, such higher subordinate commander may be called

upon at any time to command a detached force on independent detached duty, and then the organization of the task forces and the preparing of plans fall upon him.

So, while the above discussion is illustrative, it is perhaps wisest to avoid attempting any definition and to say in general terms that the phrase *higher command* includes the greater and more important activities of officers of high rank. Accepting this general definition, it may be said that the principles underlying the conduct of the higher command are those which underlie every sort of command, from the highest to the lowest, but that it is the higher command that calls for the fullest knowledge of *all* the principles of command, and for the most exact, careful, and effective application of them all.

PLAN MAKING

While plan making is of course an essential preliminary to every well-conceived and well-executed activity, the term is nevertheless generally employed in our vernacular as implying the preparation of plans of campaign for actual war or for maneuvers in preparation for war. For the former purpose a *Planning Section* has been established in the Division of Operations, Navy Department, and in this section plans are formulated for possible campaigns and thereafter kept up to date according to latest information received and to follow possible changes in policy by ourselves and by possible enemies and friends. Supposedly in close conjunction with this section would work the officers in higher command afloat; those who would be charged with the execution of such plans should the occasion arise. To prepare officers for such planning duty the War College is maintained, where officers are taught, not the best methods alone, but, what should be the same, the accepted standard methods for doing this work. Considering the making of plans as a mission, the War College trains the necessary personnel for carrying on this work, and the Planning Section actually carries it on by means of the personnel trained by the War College.

Not only must the high command officers necessarily take the part indicated in the work of the Planning Section, but they must, each in his own sphere, carry out the lesser plan making necessary for employing the fleet or its units for the purpose of carrying

out the greater plan. And so it runs down through many leading subordinates—plans within plans! The great general plan involves separate, although coordinated activities for the several higher subordinates; the particular plan of each such subordinate involves another lesser plan by each of his immediate leading subordinates, etc., and this continues until it becomes unnecessary for the final subordinate reached to draw up a written plan. Thus a plan of campaign issues from the Department; the commander-in-chief draws up and issues his plans to his force commanders, who in turn transmit these orders, or else prepare their own plans and instructions, and issue them to their commanding officers. In most cases the mission of a ship in a division is merely to carry out orders received as they are received, and at that point the preparation and issuance of special written orders ceases as a rule to be necessary; such matters are properly covered by standing orders and regulations of the fleet and ships. It is therefore apparent that all these plans should be drawn up in the same general manner and in accordance with the same general line of thought, in order that, taken together, they may form an effective and consistent whole. Hence we see that in planning, as well as in execution, indoctrination, mutual understanding, and co-operation are of vital importance. And it will no doubt be readily granted that the detailed methods of doing this work, the mechanics of it, so to speak, must necessarily be the same in all cases if we wish to avoid friction and misunderstanding.

Passing from the higher plan making of actual war, we come to that of simulated war; that is, of maneuvers. The process is the same in this case, and it is only necessary to point out in regard to it that maneuvers are not only for the purpose of exercising the fleet, etc., but are essentially a means for exercising the higher officers in coordinated effort in the plan making branch of their profession.

Further down still, we have the plan making necessary for carrying on the daily peace time activities of the fleet; in its highest form represented by the Navy and Fleet Regulations, Standing Orders, etc., all of which must at times be supplemented by special orders covering special contingencies. The more nearly the methods adopted in this work follow those taught for the

higher plan making, within reasonable and common sense limits, the more highly effective will be the work of the fleet and of the several units composing it.

STAFF WORK

The staff is the personnel which carries on the personal work of the officer in high command. Reference has been made to the *mechanics* of plan making, and as in that case, so also in every other activity, there must be certain *mechanics* of operation whereby the will of the commander is made known to and enforced upon his command. It is the duty of the officers of the staff to operate such mechanics effectively: they are concerned in all work done by the officer in high command, from the most important, the making of war plans, to the least important. His mind creates; theirs provide the detailed means for carrying out his conceptions, and they personally perform the incidental labor. It therefore goes without saying that the more highly educated are the staff officers in this particular class of work, other things being equal, the more effective is the work of the commander—a strong reason for the establishment of a school for prospective staff officers.

Not only are the staff officers concerned in the larger affairs of the fleet, but in one way or another, to a greater or lesser degree, their influence pervades and their actions affect almost every fleet activity, even the least. It is therefore necessary that such officers should possess in the highest possible degree all the qualities necessary to enable them to play their part in these lesser things, as well as in the greater, without creating friction or discord, and to the betterment of the fleet and the upbuilding of morale and efficiency; in a word, a good staff officer is one who in a high degree himself possesses all the qualities necessary for the efficient exercise of command.

KNOWLEDGE OF HOW TO ACQUIRE KNOWLEDGE

A most important requisite in the way of knowledge is the possession of the knowledge of how to acquire knowledge. At the Naval Academy (and the same is true of all schools and colleges in civil life, although in a lesser degree at the more advanced technical schools, colleges, and universities where the students

are as a rule of more mature years) our prospective graduates, in our case prospective naval officers, spend a certain limited number of years of study in trying to cover the fundamental groundwork of a knowledge for the reasonable acquirement of which a lifetime of hard study is all too short. In the nature of things, then, the work at the Naval Academy must be extremely elementary and incomplete. That institution does all that it can hope to do if it teaches the midshipmen before graduation:

1. What branches of knowledge exists that are requisite or useful to a naval officer.

2. What the general nature of each such branch of knowledge is, and upon what general principles it is based.

3. From what sources knowledge in regard to each particular branch may be obtained.

4. How to gain such knowledge from these sources; that is, how to study effectively.

5. The desire to acquire knowledge, and a realization of the necessity for doing so.

6. In what way, in general, knowledge in each such branch will be useful to a naval officer, and how to start out to learn to apply it effectively in actual life.

Summarized, this means that an undergraduate education can do little more than furnish the student with an index of knowledge and a desire to further explore the field, together with some information as to how to conduct such explorations. Very little can be taught the undergraduate as to how to actually use knowledge; that ability can only come through further and deeper study, and as the result of experience. Some never realize this—and fail. Some realize it sooner and some later, and the later the realization comes, the harder it is to catch up. And the older a thoughtful officer grows the more fully he realizes that, struggle as he may, his actual knowledge will always be far, far less in proportion to the whole field to be covered than he would desire it to be. At times this realization may bring discouragement, but when this feeling manifests itself the solace lies in the appreciation of the fact that all others are in a like predicament, and that what brings success is not the amount of knowledge possessed expressed as a percentage of the whole field that ought to be covered, but whether that percentage of knowledge is higher than that pos-

sessed by one's competitors and, more important still, by one's possible adversaries.

CHARACTER, WHICH INCLUDES THE POWER TO USE ABILITY

CHARACTER IN GENERAL

From the several dictionaries that are accepted as standard, combining those detailed definitions that are pertinent to our present subject, we may for our present purposes deduce the following definition:

Character—The combination of qualities distinguishing any person or class of persons; the aggregate of distinctive mental and moral qualities belonging to an individual or race as a whole; the individuality that is the product of nature, education, habits, and environment; highly developed or strongly marked mental or moral qualities; individuality, especially as distinguished by moral excellence; good mental or moral condition. *Character* is what one is; *reputation* is what one is thought to be.

From this definition we see that when we say that a man is of a character suitable for command, we mean that he possesses to a satisfactory degree certain mental and moral qualities; and, as a general expression of these qualities, we may say that they are:

1. *Ability,* and the power to use it
2. *Strength,* mental, moral, and physical.
3. ***Justness.***
4. *Tact.*

These four qualities will each be discussed separately, although it will be seen that there is no clearly cut line between them. The word *ability* has heretofore been employed as meaning *knowledge and the technical skill to use it,* and we now refer to the *power* to use ability, that is, to the element in character which furnishes the driving power that makes ability useful; which, in the last analysis, becomes a matter of strength of will and of character.

From a military and naval point of view we must also recognize the fact that, theoretically at least, the character of an individual may be regarded from two entirely distinct points of view; first, as to his possession of the qualities which will make him a

successful commander in a military organization and in military organizations and in military operations; and, second, as to what kind of an individual he is personally apart from his powers of command. In theory we can conceive of an individual who himself, in his immediate character, might be anything but an admirable character or honorable person, but who might nevertheless succeed to a high degree as a military commander. We therefore see that in our consideration of this topic we must recognize the existence of two theoretically separate entities, which are:

Military character, which may be defined as that phase of character which directly affects one's ability as a military commander, and

Personal character, which is that phase of character which affects the personality of the individual as a man, but which does not directly affect his ability as a military commander.

Of course there can be no such abstract separation; there is hardly any quality in a man's general character that would not directly affect both his military and his personal character. Rodney was a great naval commander, but a man of more than doubtful personal character, and in considering his case, as well as in that of many others, it has been found essential to satisfactory description and discussion to make at least a partial division of the character of the individual under the two headings given above.

MILITARY CHARACTER

The man who possesses high military character is therefore one in whom are to be found developed to a high degree the elements of character that directly and favorably affect his ability to command. It is difficult to set forth comprehensively and clearly what these elements may be, but a fair estimate may be made by stating the following qualities must be present in a high degree:

Balance—symmetry of mind; poise; evenness of mind.

Accuracy—exactitude; preciseness; ability of mind to receive impressions, assimilate them, and act upon them correctly.

Judgment—discrimination; nice perception; appreciation of difference; discernment; acuteness; penetration; wisdom; sapience; common sense; rationality; enlarged (broad) views;

wisdom in action; prudence; foresight; ability to differentiate between the practicable and the impracticable.

Quickness—acuteness of mind; ability of mind to receive impressions, assimilate them, and act upon them rapidly.

Caution—prudence; discretion; circumspection; foresight; vigilance; coolness; self-possession; presence of mind; watchfulness; not to be confused with timidity.

Stability—perseverance; firmness; constancy; steadiness; singleness of purpose; tenacity of purpose; persistence; patience; pertinacity.

Resolution—determination; will; decision; strength of mind; strength of will; firmness; stability; energy; manliness; vigor; courage—mental, moral and physical; zeal; devotedness; self-control; self-possession; self-reliance; self-government; self-restraint; self-denial; strength; perseverance; tenacity.

Courage—absence of fear; valor; resoluteness; boldness; spirit; daring; gallantry; intrepidity; contempt of danger; defiance of danger; audacity; dash; confidence; self-reliance; manliness; manhood; nerve; mettle; hardihood; fortitude; firmness; stability; resolution; prowess; willingness to take risks when necessary.

Imagination—originality; inventiveness; inspiration.

Activity—life; spirit; dash; energy; quickness; alacrity; promptitude; expedition; punctuality; eagerness; zeal; ardor; earnestness; industry; vigor; devotion; assiduity; painstaking energy; diligence; perseverance; vigilance.

Ability to inspire—power of rousing and inspiring others.

Initiative—power to act correctly on impulse generated within one's self.

Integrity—justice; justness; equity; impartiality; constancy; faithfulness; fidelity; loyalty; incorruptibility; trustworthiness; singleness of heart.

These numerous synonyms have been arranged as far as may be under the several heads indicated, but it will be noticed that they all more or less run together; that they all have more or less in common; which means, what we all know to be a fact, that character is a composite quality in which the elements have been fused into a common whole, and not a mere mechanical mixture

in which the many components have simply mingled without changing one another's character.

It will also be noted at once that practically every quality enumerated, *if possessed in too high a degree,* becomes not a virtue, not a desirable quality, but a fault in character; thus stability and resolution, if carried to excess, become obstinacy; courage pushed to an extreme; rashness, etc.

Of the qualities enumerated, that which the layman expects to find most strongly developed in an officer is *courage,* and this characteristic is therefore worthy of some special discussion, especially as that same layman is more than apt to think that, if an officer possesses mere physical courage, it is all that need be expected or required. To the civilian mind mere personal courage is very likely to cover a multitude of sins; but, while physical courage is of course a necessity in every man who is to take part in the operations of war, it is, unfortunately, far from being all that is required, or, for a man in high command, even the most important requisite; unfortunately, because of all forms of courage, mere personal bravery and disregard of danger are about the easiest qualities to find in men. There are two kinds of courage: *physical courage,* and *moral courage* or *courage of the mind.*

There are also two kinds of physical courage: first, that which is possessed by a man who by nature knows not fear; and, second, that shown by a man who, knowing fear, still shows personal bravery. Among the synonyms for courage that have been enumerated, we have two: *contempt of danger and defiance of danger;* the first phrase may well represent the courage of the man who knows not fear, and the second that of the man who, knowing fear, still shows bravery. While there are many who do not know fear, still their number is doubtless inconsiderable compared to that of those who show bravery in spite of their natural fears. It is not necessary to decide the question as to which of two such men is the more truly brave; but it may be pointed out that the first may have little or no moral or mental courage at all (as was Benedict Arnold), whereas the personal bravery of the second is based purely on such qualities of mind and soul. Also, the man who is contemptuous of danger, who naturally does not know what fear is, is more apt to be over-courageous; rash, lacking in judgment; than is he who, knowing danger and perhaps feeling fear,

nevertheless defies it and carries on his duties bravely and unhesitatingly, because of his high sense of duty, honor, and love of country, or other cause. The courageous man, who yet appreciates and reflects on danger and prepares himself to meet it, is the one who produces valuable results, while the rash and over courageous man performs acts of which it may be truly said: *"C'est magnifique; mais ce n'est pas la guerre."*

Personal courage, the power to defy personal danger, is a common virtue, however, and never was this more conclusively shown than by the matter of fact way in which officers and men, very many of them absolutely green to the service and to sea life, went about their duties at sea during the late war, most of them in fear, no doubt, but all, almost without exception, in nonchalant disregard of the ever present submarine peril. Fear of the submarines no doubt existed in most hearts, but it led to vigilance and care, and not to fright or cowardice. So mere physical courage is the least uncommon form of that quality; the one which we can always count upon, barring low morale or some sudden temporary panic generally resulting from such lower resisting powers. Harder to find are the men who possess *moral* and *mental* courage; the strength of character and will that enables them to assume and bear responsibility in times of stress and danger; and this quality is absolutely necessary in an officer who is to exercise the higher command. And not only must such commander have this moral courage and strength of character, but he must also be able to bear equably and without detriment to his other qualities, the strain that responsibility throws upon him. Unless he can do this with a confident bearing, concealing any doubts and fears that may beset him, he cannot expect to maintain the confidence and morale of his force. Napoleon almost without exception failed to find admirals who possessed this most necessary quality: "poltroon of mind, though not of heart," he called one of them.

PERSONAL CHARACTER

Personal character is that phase of character which exerts no direct influence, or no influence at all, upon the ability of the individual as a military commander. Probity in financial affairs, morality in the limited and technical sense of the word, etc., may

be mentioned as the most prominent features of personal character. Even temper, a sympathetic disposition, etc., are other such qualities. With the personal qualities of the individual, so long as they are strictly personal only, we have little to do, but so rare is it the case that personal character does not markedly affect military character, that in our estimation of any individual we must consider personal as well as military character, and in education, training, environment, and in governing the formation of habit, we must give great attention to the creation of high personal as well as high military character.

RECIPROCAL EFFECT OF MILITARY AND PERSONAL CHARACTER UPON EACH OTHER

We have just noted that military and personal character cannot really be separated; that one affects the other. Therefore if we wish to build up one we must build up the other. In the definition we find that character, among other things, is *the individuality which is the product of nature, education, habits, and environment.* That is, in each individual, nature provides, congenitally, a certain field for development; and the resultant character depends, first, upon the qualities inherent from birth, and, second, upon education, habits, and environment. Now these last three forces must be applied to the individual as a whole; they cannot touch the formation of military character without touching that of personal character as well; and from this fact flows the reasoning that prompts us to safeguard the personal character of the recruit and of the younger officer and midshipman; to educate them generally as well as in strictly naval matters, and to guard their environment and their formation of habits. A bad personal habit must reproduce itself in some form in military habits; a poor environment as to personal character will lead to poor personal habits, which will in turn surely become incorporated into the military habits of the individual. The sin of personal laziness is perhaps typical of this process; natural disposition and environment create this bad personal habit, and this very soon becomes transmuted into military sin of lack of zeal and industry and its kindred faults.

No better examples of the effect of personal character upon military character can be given than those of Rodney and Nelson.

For a full analysis of these cases see Mahan's *Types of Naval Officers* for the former and *Life of Nelson* for the latter. It is enough to say here that Rodney allowed his personal interest in certain financial transactions to seriously affect his performance of duty as an officer; whereas Nelson in a marked degree, in his earlier days at least, subordinated all personal considerations to the demands of duty, even at much cost and trouble to himself. In his later days Nelson, under the evil influence that more or less controlled him, showed in himself a similar difference, as contrasted with the Nelson of the earlier days.

REMARKS ON THE QUALITIES OF MILITARY CHARACTER

While space does not permit the effort to illustrate the need for each of the qualities enumerated as requisite for high military character, some few discursive comments and illustrations will not be without interest, and it is hoped may be permitted.

Of all the qualities of mind enumerated, which, if any, can be said to be the most important? There can be no positive answer to this question, any more than there can be to the query as to whether the motive power or the armament of a ship is the most important; but in considering it there is to the writer a strong temptation to say that, given other qualities in a reasonable degree, *quickness,* or rather, *accurate quickness,* is of the first importance; for a naval officer with a slow mind is an annoyance to himself and a thorn in the flesh to his seniors.

An excellent example of proper stability of mind was shown by Admiral Togo during the Russo-Japanese war, while he was waiting in the Straits of Tsushima for the arrival of the second Russian fleet. When that fleet was very slow in arriving and when his scouts failed to find it as anticipated, there was very strong pressure brought to bear upon him from others, many of them of very high rank (doubtless his own mind also strongly urged him in the same direction) to act on the assumption that the enemy had gone to sea with a view to approaching Vladivostok through the Straits of Tsugaru, thus avoiding the Japanese fleet at Tsushima. Togo withstood all such pressure, feeling that his estimate that the Russians would pass through the Sea of Japan must be right, and while not neglecting other precautions, he

clung firmly to the belief that seemed to him to be logical and right, with results that are known to the world.

STRENGTH OF CHARACTER

In our consideration of character were enumerated many qualities of mind and soul that are essentials of high military character. Looking back again at those essentials we see that they represent in general: first, the high impulse from within that tells an officer wherein his duty lies and inspires within him the desire to perform that duty to the highest possible degree; and, second, the driving power or force which enables him to move steadfastly and resistlessly in response to the call of duty thus presented to him. In some lights the terms *strength of character* and *high military character* may be regarded as synonomous, but again there is a fine shade of difference in definitions. High military character involves strength of character, it is true, but it might perhaps be justly argued that in high military character there are other elements than strength. Be that as it may, there is no doubt that strength of character involves the strength to decide correctly and in accordance with the highest dictates of honor and patriotism, and therewith the power to carry out and enforce the decisions thus made. And this power must be of a two-fold nature, for not only must an officer have within himself the power to carry out his decisions by causing his subordinates to think and act loyally and effectively in accordance with his will and purpose, but he must be able to achieve also the often far more difficult victory of driving himself along the path of duty. No doubt habit, training, every instinct of an officer, will lead him along the path of duty, but even to the strongest and best there come times of inertness, of lethargy, of discouragement, of hesitancy and doubt; of what not enemies to strength and vigor; times when the temptation to relax effort, to avoid decision, to aim something short of one's full duty, is almost overpowering. It is in these moments that strength of character comes to the rescue; for then its possessor, buoyed up by the power and spirit that are within him, moves unswervingly along the path of duty, and what is equally important and perhaps even harder—for he who holds high command is necessarily a lonely soul in his moments of extreme trial—does it calmly and quietly, and with

a smiling and unwavering face and bearing, in order that none about him may perceive the doubts that are within. This is strength of character in its military sense at its best; and without it no man can hope for success in high command.

PHYSICAL STRENGTH, AND ITS EFFECT UPON STRENGTH OF CHARACTER

From what has just been said of the need of strength of character it will necessarily be seen that physical strength is a very great asset also, for it is well-nigh impossible for any man to make the efforts of mind and will just described if he be at the same time struggling with physical weakness, and physical weakness is therefore more than apt to affect strength of mind and of character unfavorably. Some historical examples, notably that of Nelson, are often cited to show that a man can be a great commander; can possess great strength of mind and of character; even though lacking in physical strength, or even when actually the victim of almost constant physical suffering. This is no doubt true, but we must certainly consider such cases as very exceptional. And who can know to what degree his physical weakness may have been responsible for the not infrequent shortcomings of Nelson in both judgment and action? Also, as history does not record them as great, who can say how many and what men, otherwise well qualified to command, failed because of physical infirmities and of their effect upon their character and powers? There are cases in which men who have already proved themselves great have in their actions shown the result upon their strength of character of physical infirmity due to age. One of these was Lord Howe, a man noted for his strength and equanimity of character, at the time of his great battle of June 1, 1794, at which time he was sixty-eight years of age. This battle was fought after four days and nights of almost continuous maneuvering, with several partial engagements, during which the English attempted to gain the weather gage originally held by the French, and succeeded, and during which Lord Howe was unable to get any rest except such as could be taken in an arm-chair. By the time the battle ended he was utterly exhausted and had to be helped to his cabin, and failed to follow up his victory to the utmost; being encouraged in this failure by his chief of staff.

In narrating the events of this action Mahan speaks of this, and infers that it would undoubtedly have been Lord Howe's impulse to pursue had not his physical infirmities practically disabled him for the moment. Speaking of this, Mahan says:

" . . . In truth, it was impossible for Howe to purpose otherwise (than to pursue). Having been continuously what he was in his prime, it could not be that he would not intend, with all the force of his will, to persevere to the utmost in the duty before him. The faithfulness of a lifetime does not so forsake a man in his end. What he lacked at that critical hour was not the willing mind, but the instrument by which to communicate to the fleet the impulse which his own failing powers were no longer able to directly impart."

Strength of character may therefore overcome physical weakness at times, but as Mahan has said in a passage previously quoted, even when this be done successfully, the effort to accomplish it must necessarily be a drain upon a man's total resources of soul, which must perceptibly detract from his total power of accomplishment.

POWER TO USE ABILITY; THE "WILL TO ACHIEVE"

Performance has been said to depend upon several qualities: first, ability—that is, knowledge and the technical skill to use it; second, high military and personal character—which furnish qualities necessary for effective action; and third, strength of character, of mind, of soul, and of body. This last, strength, has been considered in part as an element of character, and such it is; but beyond that, its importance is so great that it may well be considered as an element of command in itself. Its first action is to inspire in the individual the *"will to achieve,"* and to do this it calls upon a number of motives, personal, perhaps selfish, as well as altruistic. Ambition, for one's self and for one's service and country; loyalty to country, duty, service, and to one's immediate commander; and perhaps other motives; all combine to inspire this *"will to achieve."* This is the mainspring of all action, for under its impulse the commander acts, first to determine his duty and what his actions should be to perform it, and then to act accordingly.

JUSTNESS

To denote the quality which it is now desired to discuss, the word *justness* has been taken rather than the more common word *justice*, for the reason that, while the dictionary definitions of the two words are in general form the same: namely, "the quality of being just," nevertheless *justice* is most frequently understood in its restricted and secondary definition, as being "the administration of the law." Unless capable of administering absolute justness, a commander will fall short of perfection by just so much as he fails in this respect, and will correspondingly fail to inspire in those around and under him the high degree of morale and loyalty without which no commander can hope to be successful. While the word *justness* as used includes legal and military *justice*, in other words justness in the administration of discipline, that phase is by no means all; in fact it is in reality a lesser aspect of the broad question. Justness in personal relations, sympathy with others, tact, etc., are all essential elements of justness in its truest and best sense. And, what is too often forgotten, justness means, not only nor even mainly, the disciplining of those who fail or offend, but to a much greater degree the encouragement and commendation of those who do well. An officer who is quick to rebuke but slow to commend is essentially and fundamentally unjust, and such an one can never secure from his subordinates the highest degree of loyalty, morale, and efficiency; can never hope to win from those whom he commands the "last touch that cannot be commanded but can only be given"; that "free contribution of the man to his defined duty" of which Professor Hocking speaks.

TACT

Tact is a somewhat intangible asset and correspondingly hard to define, but it is nevertheless the binder whereby the qualities requisite for command of personnel are unified and made effective in all dealings with those under one's command; without it the value of all other qualities is very greatly reduced. It may be said with confidence, however, that unless tact be based on justness it will be valueless; officers and men are quick to detect the defective character of an outwardly tactful bearing and of actions that do not contain within themselves the essentials of justness.

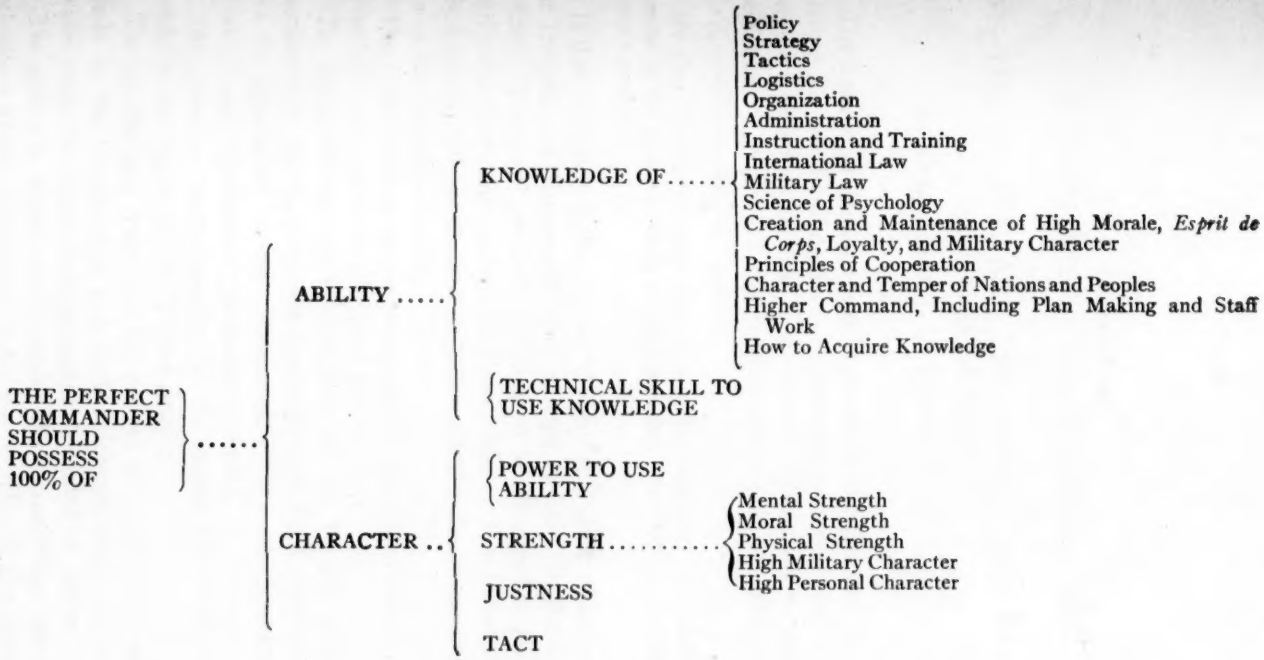
Mere outward and superficial tact; such tact as is often displayed on social occasions; while perhaps creating a favorable prepossession in the first stages of acquaintanceship or of official relationship, will not carry far if it be merely on the surface; and when lack of sincerity is once detected such tact becomes, not an asset, but a constant and most irritating cause for offense and discontent. Whatever be the motives prompting the employment of a tactful bearing and of tactful actions, if they be not based on natural feelings and a sympathetic nature; if they be based on an acquired and not upon a natural habit; if they be exercised only to accomplish certain results ("for what there is in it"); the hollowness of the pretense will soon be discovered, and as a result bad, and not good, consequences will follow.

SUMMARY OF REQUISITES FOR COMMAND

Having now analyzed the principal requisites for successful command, and segregated and discussed the major principles underlying them, it becomes possible, as a summary, to construct the character of an officer in high command as it should be. The appended diagram shows the requirements that have been considered in the preceding pages, but even with that, all is not said, for in discussing the perfect man, whether in general or as an officer, there are so many fine shades of meaning that enter, so many elements that must be present, that we can only despair of reaching anything more than reasonably accurate general conclusions. For instance, we have noted certain qualities as requisite, and have pointed out that the possession of certain, if not all, of these qualities in too high a degree, become positively detrimental. Where does self-confidence become self-conceit, and transform itself from a necessary quality into one which blinds its possessor to many things that he should see and appreciate, and thereby lead him into egregious errors? This, and many other similar questions, can receive no concrete answer; and, because this is the case, the subject can never be covered in a thoroughly satisfactory manner. Nor is it believed that the qualities enumerated cover everything that is requisite; probably every reader of this thesis will think of something that has been omitted; so the writer can only say that he fully realizes the incompleteness of this paper, in spite of its length, and the fact that many points

worthy of great elaboration have been touched upon but lightly, if at all.

It may be deduced at once from the statement of the requirements that no man can ever be a perfect commander; it is evident that omniscience alone could accomplish this; and the men whom history has recorded as the greatest each appears, when his life, character, and actions are closely analyzed, as falling short of the perfect standard in many respects. This is true of the man who probably stands highest of all in naval reputation, Nelson; and if failure to attain perfection exist in even the greatest of whom history teaches, there is little chance that the future will ever produce the perfect commander. That this is true need cause no discouragement to the officers of our service, for, as has already been said, what is true for us is equally true for others, and, while we realize that we must always fall far short of what we would wish to be, at the same time the officers of other navies are in a like predicament. Therefore it is our duty, while striving to reach the highest degree of perfection attainable, not to be discouraged by our own shortcomings *so long as we can feel assured that such shortcomings do not exceed those of officers of any other navy*. While we cannot hope to be perfect, we can, if we bend our entire strength to the effort, feel reasonably sure that we will not be surpassed by those who may come up against us, and may hope that we may exceed the majority in excellence; it is to this end that every officer of our navy should exert himself unremittingly and to the utmost.


THE PERFECT COMMANDER SHOULD POSSESS 100% OF
ABILITY
KNOWLEDGE OF
Policy
Strategy
Tactics
Logistics
Organization
Administration
Instruction and Training
International Law
Military Law
Science of Psychology
Creation and Maintenance of High Morale, Esprit de Corps, Loyalty, and Military Character
Principles of Cooperation
Character and Temper of Nations and Peoples
Higher Command, Including Plan Making and Staff Work
How to Acquire Knowledge
TECHNICAL SKILL TO USE KNOWLEDGE
CHARACTER
POWER TO USE ABILITY
STRENGTH
Mental Strength
Moral Strength
Physical Strength
High Military Character
High Personal Character
JUSTNESS
TACT

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

WE, THE PEOPLE, AND THE TREATY POWERS OF OUR GOVERNMENT

By COMMANDER J. O. FISHER, U. S. Navy

The League of Nations was rejected by the Senate. A Conference for the Limitation of Armaments is under way. What are the restrictions on that Conference? How will its decision be ratified? What are the treaty-making powers delegated in the Constitution by the words:

> He (the President) shall have power, by and with the advice and consent of the Senate to make treaties, provided two-thirds of the Senators present concur.

Is that delegated authority the "Sovereign Power which relates to Treaties and Agreements with foreign nations" in the United States? These are questions which must be answered to give any agreement authority under our Constitution. For instance, can the authority delegated above regulate tolls for American shipping using the Panama Canal?

The treaty-making power delegated by the Constitution to the President and Senate is a limited power.

The treaty-making power delegated, by the People, to all departments of the Government established by the Constitution, is not the equivalent of the "Sovereign Power which relates to Treaties and Agreements" in many countries.

The power to make treaties, "in its utmost plentitude," rests solely in the People of the United States.

The treaties and treaty-making powers are referred to several times in the Constitution and each reference adds to, or subtracts from, the treaty-making power delegated as above.

The power to make treaties under the Constitution was a development of our experience under the Articles of Confederation

of the Thirteen States. Treaty-making and membership in an Agreement is not a new or novel experience for the People of the United States.

A review of that experience should be of interest, and, in combination with an examination into the treaty-making powers delegated under the Constitution, will demonstrate conclusively the necessity for the submission of most treaties with other nations to "We, the People," as represented by Congress, and in a few cases as an amendment to, and in the manner provided by, the Constitution.

Article III of the Articles of Confederation reads:

> The said states hereby severally enter into a firm league of friendship with each other, for their common defense, the security of their liberties, and their mutual and general welfare, binding themselves to assist each other against all force offered to, or attacks made upon them, or any of them, on account of religion, sovereignty, trade, or any other pretense whatever.

This is not quite as ambitious in intent as several treaties and agreements proposed in the last few years. It was made or entered into during war on a common enemy. It is a defensive league. It is of interest as defining the intent of the Thirteen States under the Articles of Confederation and as demonstrating that agreements, leagues and alliances between several nations are not a new and novel experiment in our history.

Another of the Articles of Confederation reads:

> Each State retains its sovereignty, freedom and independence, and every power, jurisdiction, and right, which is not by this Confederation *expressly* delegated to the United States in Congress assembled.

The Thirteen States recognized that a League could not be effective without powers, but at the same time, they were determined to give few powers and required that these be expressly delegated, that is, in words meaning just that, without the aid of inference, and susceptible of no other meaning.

The States entered this League of Friendship, not the People of the States. The States retained all sovereign powers except those expressly delegated, and when they obtained their independence they would have severally acquired the sovereign powers previously held by Great Britain.

In the Federalist Papers we find the "League of Friendship" established by the Articles of Confederation, examined from all angles and in most thorough detail.

The United States had an indefinite discretion to make requisitions for men and money; but they had no authority to raise either, by regulations extending to the individual citizens of America.

There was no penalty annexed to disobedience, the resolutions or commands which pretended to be laws were, in fact, nothing more than advice or recommendation.

One of the objections to penalties as applied to States which did not act in accordance with the recommendations made under the League of Agreement was:

A penalty can be inflicted by the agency of the courts and ministers of justice or by military force; by the coercion of the magistracy, or by the coercion of arms. The first applied only to men. The last must be employed against bodies politic, or States, and then every breach of the agreement must involve a state of war; military execution becomes the only instrument of civil obedience.

The interposition of the State legislatures was necessary to give effect to a measure of the Union, and they had only *not to act*, or to *act evasively*, and the measure was defeated.

It has not a little contributed to the infirmities of the existing federal system (i. e., Articles of Confederation), that it never had a ratification by the PEOPLE. Resting on no better foundation than the consent of the several legislatures (i. e., of its component States), it has been exposed to frequent and intricate questions concerning the validity of its powers. (Federalist letter from the New York Packet, December 14, 1787.)

The possibility of a question of this nature proves the necessity of laying the foundations of our national government deeper than in the mere sanction of delegated authority. The fabric of American empire ought to rest on the solid basis of THE CONSENT OF THE PEOPLE. The streams of national power ought to flow immediately from that pure, original fountain of all legitimate authority. (Same reference as preceding paragraph).

With this previous experience, the United States should carefully examine all treaties, agreements, alliances and leagues and insist that each be rid of those defects which were remedied in

the Federal Constitution ordained and established by "We, the People of the United States of America."

The consent of the People was the paramount omission in the League of Friendship. Will any agreement for the limitation of armaments be submitted to the People? Is such consideration necessary? Have the People delegated the power of ratification to the Government of the United States under the Constitution?

These are questions which can best be answered by those in whom the People of the United States have confidence. A confidence, resting not on the opinion of the moment, but on accomplishment, tested by Time. It is in the written record which Washington and Lincoln left, that guidance will be sought.

George Washington, when offering the office of Secretary of State to Patrick Henry under date of 9 October, 1795, commented on his foreign policy for our new republic as follows:

> My ardent desire is, ... to keep the United States free from political connections with every other country, to see them independent of all and under the influence of none. In a word, I want an American character, that the powers of Europe may be convinced we act for *Ourselves*, and not for others.

An examination of the powers delegated under "We, the People of the United States, ... do ordain and establish this Constitution for the United States of America" to demonstrate that the Constitution does consist only of powers delegated by the People of the United States is very easy and certain. The people have Washington's words to Lafayette "That the general Government is not invested with more powers, than are indispensably necessary to perform the function of a good Government; and consequently, that no objection ought to be made against the quantity of power delegated to it." Washington again affirms his belief in the powers of the People in these words:

> The power under the Constitution will always be in the People. It is entrusted for certain defined purposes, and for a certain limited period, to representatives of their own choosing; and whenever it is exercised contrary to their interest, or not agreeable to their wishes, that their servants can and undoubtedly will be recalled.

In an examination and interpretation of the Constitution, the People have the guidance of Lincoln, who preserved the Constitution and the Government, when judicial interpretation of the

Constitution by a bare majority of a divided court had involved our United States in Civil War.

Lincoln in his masterly speech at Cooper Union and in reference to the Dred Scott decision of the Supreme Court said:

> When I say the decision was made in a sort of way, I mean it was made by a divided court by a bare majority of the judges, and they not quite agreeing with one another in the reasons for making it; that it is so made as that its avowed supporters disagree with one another about its meaning, and that it was mainly based upon a mistaken statement of fact . . . the statement in the opinion that the right of property in a slave is distinctly and expressly affirmed in the Constitution.
>
> An inspection of the Constitution will show that the right of property in a slave is not distinctly and expressly affirmed in it. Bear in mind the judges do not pledge their judical opinion that such a right is impliedly affirmed in the Constitution; but they pledge their veracity that it is distinctly and expressly affirmed there—distinctly, that is, not mingled with anything else—expressly, that is, in words meaning just that, without the aid of any inference, and susceptable of no other meaning.
>
> If they had only pledged their judicial opinion that such right is affirmed in the Constitution by implication, it would be open to others to show that neither the word slave nor slavery is to be found in the Constitution, nor the word property even, in any connection with the language alluding to the things slave, or slavery, and that wherever in that instrument the slave is alluded to, he is called a person; and wherever his master's legal right in relation to him is alluded to, it is spoken of as service or labor due, as a debt payable in service or labor. Also it would be open to show, by contemperaneous history, that this mode of alluding to slaves and slavery, instead of speaking of them, was employed on purpose to exclude from the Constitution the idea that there could be property in man. To show all this is easy and certain."

In his plain and simple analysis of a judicial decision, Lincoln had made clear a method of interpretation of the Constitution of the United States of America.

The "upright intentions" of the People of the United States are clearly stated in the preamble as being "to form a more perfect union," "to establish justice," "to insure domestic tranquility," "to provide for the common defense," "to promote the general welfare," "to secure the blessings of liberty to ourselves and our posterity." The language is clear. The intentions specified are distinctly and expressly domestic. Other nations are not mentioned, except that "to provide for the common defense" refers, by implication, to them.

The Constitutional Convention met at Philadelphia on 25 May, 1787, and George Washington was unanimously called to the chair as president. The Constitution received the assent of the Convention on 17 September, 1787. In his letters covering this period, Washington always refers to the business of the Convention as a question of government for the Union, "that all who live under it may be secure in their lives, liberty, and property."

From Washington's letters, from the wording of the Constitution itself, the clear intent was to establish a government.

> Weak at home and disregarded abroad is our present condition (i. e., under the Articles of Confederation of the United States of America), and contemptible enough it is,

is a statement by Washington written during the sitting of the Convention.

Surely at this time and under these conditions the establishment of a domestic government was no small undertaking. How ridiculous, in view of the fact that we were "disregarded abroad" would have been the intention to provide for entry into a world agreement of any kind.

The intent of the People of the United States expressed in the Constitution has not been changed. A method for its amendment was provided and has been available.

> "Their own power over their own instrument remains. But until they shall alter it, it must stand as their will, and is equally binding on the General Government and on the States," are the words of Daniel Webster.

The first ten amendments were proposed during the first session of the Congress and were ratified 15 December, 1791, the series being in the nature of a "Bill of Rights."

We have the Federalist on a "Bill of Rights" as follows:

> Here (in the Constitution) in strictness, the People surrender nothing; and as they retain everything, they have no need of particular reservation. . . . For why declare that things shall not be done which there is no power to do?

Washington's opinion of the Federalist was:

> That work will merit the notice of posterity because in it are candidly and ably discussed the principles of freedom and topics of government.

The Federalist and the Constitution established as new principles of Government:—"That the Government has powers only as

they are delegated by the People" in place of the centuries-old principle of oppression—"That the People have rights only as they are granted by Kings and Governments.

Washington, in a letter to Lafayette on politics, dated 28 April, 1788, states:

> There was not a member of the Convention, I believe, who had the least objection to what is contended for by the advocates for a "Bill of Rights", . . . where the people evidently retained everything, which they did not in express terms give up, . . .

Included in the "Bill of Rights" to which not a member of the Constitutional Convention objected, was the Ninth Amendment, reading:

> The enumeration in the Constitution of certain rights, shall not be construed to deny or disparage others retained by the people.

We have Washington's word that he believed there was not a member of the Convention who had the least objection to this amendment or to the others included in the "Bill of Rights"—"where the people evidently retained everything, which they did not in express terms give up." Without a single objection, among the members of the Convention, this principle was admitted. For the people to retain everything would include all powers not delegated in express terms, that is, in words meaning just that, without the aid of any inference and susceptible of no other meaning.

The Tenth Amendment is a re-affirmation of the powers reserved to the People and an affirmation of those reserved to the States, respectively. It reads:

> The powers not delegated to the United States by the Constitution or prohibited by it to the states, are reserved to the States, respectively, or to the People.

Therefore, in support of a strict interpretation of the Constitution which requires a distinct and express delegation of powers by the People we have, first, Washington's statement of the attitude of members of the Constitution Convention toward the "Bill of Rights." Second, we have the Federalist on the "Bill of Rights." Third, we have the Ninth Amendment. Fourth, we have the Tenth Amendment. Fifth, we have the Principle of Government established by the Constitution that "the Government has powers only as they are delegated by the People."

It is submitted, that the delegation of implied powers under the Constitution is wrong in principle and is repugnant to the clear intent of that Instrument.

The Constitution expressly delegated the power to make treaties, as follows:

> He (the President) shall have power, by and with the advice and consent of the Senate, to make, treaties . . ."

The Constitution expressly prohibits powers to the States, as follows:

> "No State shall enter into any treaty, alliance, or confederation . . ." and "No State shall, without the consent of Congress, . . . enter into any agreement or compact with another State, or with a foreign power, . . ."

No construction is necessary here. The Constitution declares distinctly and expressly that "no State shall enter into any treaty, alliance, or confederation." It is clear that "any" includes "treaties, alliances, and confederations" of all kinds and degree.

These powers in regard to treaties, alliances, confederations, compacts and agreements are not delegated to the United States by the Constitution in the express and distinct terms with which they are prohibited to the States.

Entry "into any treaty, alliance or confederation and any agreement or compact" is prohibited and it is plain that any treaty, alliance, confederation, agreement or compact is more comprehensive than "treaties," and consequently certain power relating to treaties are retained by the People.

Hamilton in the Federalist of 14 March, 1788, said:

> The King of Great Britain is the sole and absolute representative of that nation in all foreign transactions. He can of his own accord make treaties of peace, commerce, alliance, and of every other description. . . . . Every jurist of that kingdom, and every other man acquainted with its constitution, knows, as an established fact, that the prerogative of making treaties exists in the crown in its utmost plentitude . . . independent of any other sanction. . . . But this parliamentary interposition proceeds from the necessity of adjusting a most artificial and intricate system of revenue and commercial laws, to the changes made in them by the operation of the treaty; . . . In this respect, therefore, there is no comparison between the intended power of the President, and the actual power of the British sovereign. . . . If the Confederacy were to be dissolved, it would become a question whether the Executives of

the Several States were not solely invested with the delicate and important prerogative.

The sole and absolute right of the King of Great Britain in foreign transactions has no existence in our Government of delegated powers.

The sovereign power which relates to treaties, in Great Britain was "the prerogative of making treaties which exists in the Crown, in its utmost plenitude." This sovereign power would have rested solely in the executives of the several states if the Articles of Confederation had been dissolved.

However, the Articles of Confederation between the States was replaced by the Constitution for the United States of America, ordained and established by the People of the United States. Some of this sovereign power which relates to treaties was prohibited the States, some was delegated to Congress, some was delegated to the President and some was delegated to the Supreme Court. It is clear that the intention was to impose limits on "the sovereign power which relates to treaties and agreements with foreign nations" as evidenced above and that the People reserved the Powers not delegated.

Treaties and agreements may cover all subjects within the control of a "sovereign government." Our Government, however, is a government of delegated power only. It is divided into three distinct and separate departments, the Legislative, Executive, and the Judicial. Powers are delegated to each to perform its part in the scheme of government as a whole. The power to make treaties and agreements of all kinds and descriptions is greater than that delegated to any branch of the government or to them all collectively. The principle is repugnant to a Constitutional Republic.

The power to make treaties and agreements implies the right to make laws since the treaties are to be the supreme law of the land, but, the Constitution expressly states that ALL legislative power is delegated to Congress.

The prohibition of entry into any agreement or compact with any other state or with a foreign power, is limited for each and every State by the words "without the consent of Congress." It does not state, without the consent of the treaty-making power, or without the sanction of the judicial power, but it states dis-

tinctly and expressly "without the consent of Congress." It is clear from this that the power prohibited to the States, of entry into agreement and compacts with a foreign nation, was considered to come more within the powers delegated to Congress than any other branch of the Government, including the treaty making power itself.

The Constitution provides that "all treaties made or which shall be made under the authority of the United States, shall be the supreme law of the land." They must be made under the authority of the United States. The President and two-thirds of the Senate constitute only a part of "the authority of the United States."

The Constitution provides that "the Judicial Power shall extend to all cases in law and equity arising under this Constitution, the laws of the United States, and the treaties made, or which shall be made, under their authority."

Power is delegated to the President and the Senate from the same source, i. e., "We, the People," which delegates all the legislative power to the Congress and which vests the judicial power in the Supreme Court.

The clear inference from this is that the treaty-making power delegated must not infringe the legislative or judicial power expressly and distinctly delegated.

The delegation of the legislative power, is expressed as "All legislative powers herein granted shall be vested in a Congress" but under that same article in the Constitution, power is expressly and distinctly delegated to Congress *"to regulate commerce with foreign nations, and offenses against the law of nations; to declare war; to raise and support armies."*

From these distinct and expressed powers of Congress, it is clearly and plainly the intention of the Constitution to delegate to Congress powers which are sometimes included in the "sovereign power which relates to treaties."

The legislative power expressly and distinctly granted also requires that "Congress shall have power to make all laws which shall be necessary and proper for carrying into execution the foregoing powers and all other powers vested by this Constitution in the Government of the United States, or in any department or officer thereof."

"The foregoing powers and all other powers vested" are the words used. "All other powers" means all powers additional to the legislative powers listed previously in that section and article of the Constitution.

Among all other powers vested by the Constitution, etc., is the power to make treaties. Provided this phrase read "all powers vested by this Constitution," etc., the power to make treaties would still be included. It reads, however, "All other powers," etc., which means, all powers, not the same, or additional, to the specific legislative power vested by the Constitution.

This provision of the Constitution expressly and distinctly refers to other powers, as additional and not included in the legislative power and places the authority in Congress "to make all laws which shall be necessary and proper for carrying into execution all powers vested by this Constitution in the Government of the United States or in any department thereof."

The treaty-making power is vested in a "department of the Government of the United States" and treaties made by the President and Senate are dependent on Congress for laws to execute them. Therefore, the express and distinct intent is that powers vested in Congress shall limit the delegated power vested in the President and the Senate to make treaties, and treaties so made, shall not infringe the distinct and express legislative power delegated to Congress.

In reading the Federalist on the powers to make treaties, it is apparent that the treaty-making power delegated to the President and the Senate should not give them the power to do every other act of sovereignty in treaty relations by which the citizens are to be bound and affected.

The second amendment to the Constitution, included in the "bill of rights," to which reference has been made previously, reads: "a well regulated militia being necessary to the security of a free state, *the right of the people to keep and bear arms* shall not be infringed." The first sentence in this article is a statement of truth or principle as accepted by the first Congress.

Was the right to raise and support an army exposed to infringement by the treaty-making power delegated to a department of the Government? It is absurd to imagine that a people who would not delegate their right to keep and bear arms to their Govern-

ment, should deliberately place *in a department of that Government, the right to make treaties, which could limit or disparage the right to raise and support armaments.*

In the Federalist, Hamilton states:

> There is nothing absurd or impracticable in the idea of a league or alliance between independent nations for certain defined purposes precisely stated in a treaty regulating all the details of time, place, circumstances, and quantity; leaving nothing to future discretion; and depending for its execution on the good faith of the parties. (Federalist letter No. 15—For the Independent.)

Treaties are made between independent nations. The purpose of a treaty must be defined. These purposes can include a league or alliance. All details of time, place, circumstances and quantity must be precisely stated. Nothing in a treaty can be left to future discretion. A treaty depends for its execution upon the good faith of the parties and the use of force against any party to the treaty is repugnant to the idea of a treaty. This is the idea of a treaty as the word was used in the Constitution for the United States of America.

The purpose of any agreement for the reduction of armament must be defined. What is that purpose?

The Second Amendment to the Constitution reads: "A well regulated militia being necessary to the security of a free state, the right of the People to keep and bear arms shall not be infringed."

It is not clear how any agreement for the limitation of armaments can have any purpose which is not a violation of the Second Amendment quoted above, or of the distinct and express power delegated to Congress "to raise and support Armies."

The treaty-making power delegated in the Constitution to the President and the Senate is not sufficient to enter a World Agreement for the Limitation of Armaments. It is not even the equivalent of the "Sovereign powers which relates to treaties" of other nations. It was so limited with clear and well defined ideas of the functions of treaties and agreements and their purposes by the Framers of our Constitution.

It therefore must be approved by Congress, and if it applies to State militia it must be submitted to "We, the people."

It does not delegate expressly and distinctly the power of entry into any agreement.

It is limited by the statement that the power prohibited to the States, is, "entry into any treaties, alliances or confederations;" the power delegated is, "to make treaties." The difference between the powers delegated and the powers retained is reserved to the People.

The treaty-making power is further limited by the prohibition to the states of entry into any agreement or compact with a foreign power without the consent of Congress.

It is limited by the granting of all legislative power under the Constitution to Congress.

It is limited by the distinct and express delegation of power to Congress to "raise and support armies."

It is limited by vesting the judicial power in all cases in law and equity under treaties made, in the Supreme Court.

It is limited by specifying that all treaties made under the authority of the United States (i. e., not a department of the United States) shall be the Supreme Law of the Land.

All these limitations operate to decrease the sovereign powers delegated, which relate to treaties.

At the time of the Constitutional Convention, leagues, alliances, federations, agreements, compacts, and their nature was known and understood as noted by the Federalist papers. The idea of a world agreement for the limitation of armaments was not at that time in existence. Our Government was instituted for certain purposes distinctly and expressly affirmed in the preamble to the Constitution. The intention was domestic only.

The powers delegated under the Constitution were delegated for the purpose distinctly and expressly affirmed.

The power of entry into any agreement for the limitation of armaments was not delegated. It has not been delegated.

The sovereign power which relates to treaties rests with "We, the People of the United States." Its assumption to enter into any agreement for the limitation of armaments is not impliedly affirmed by the Constitutional powers which were delegated "to effect a more perfect union, ... and secure the blessings of liberty to ourselves and our posterity." It is distinctly and expressly negatived by the Second Amendment to the Constitu-

tion which reads: "A well regulated militia being necessary to the security of a free state, *the right of the people to keep and bear arms shall not be infringed.*"

Assumption of power by the Government is repugnant to the institutions of our republic. It is abhorrent to the principles of Government of the People, by the People, and for the People. It repudiates the wisdom of Washington and ignores the teaching of Lincoln.

The American People will do well to remember Washington's words that:

> When a People shall have become incapable of governing themselves and fit for a master, it is of little consequence from what quarter he comes.

If and when, "We, the People" of the United States desire to amplify the clear intent of the Constitution, or the powers delegated thereunder to the Government of the United States, a method is provided in the Constitution. It has been used in the past. It must be used now unless the decision as regards an agreement for limitation of armaments is to be made in a "sort of a way," as Lincoln characterized the decision in the Dred Scott case; i. e., by a bare majority of a divided government, and they not quite agreeing with one another in the reasons for making it; so made that its avowed supporters disagree with one another about its meaning, and plainly based upon a mistake of facts—that the power to enter such an agreement is distinctly and expressly affirmed in the Constitution under the power to make treaties delegated to the President and the Senate.

The People of the United States do not want the decision on the limitation of armaments made in a "sort of way."

There exist many and substantial reasons why any agreement for the limitation of armaments should be submitted for the action of the People of all Member Nations.

Ratification by the People of all its member nations would eliminate the primary defect which existed in the League of Friendship under the Articles of Confederation of the Thirteen States.

Such a ratification would substitute the coercion of the magistrate which applies to men, for the coercion of force, which must be applied to bodies politic. The coercion of force, of any kind,

against a body politic is an unfriendly act and is the cause of ALL wars.

There exist no reasons why the validity of any action by the United States should be questioned.

Submission to the People of the United States will remove all doubt.

Any other action denies the principle on which our Constitution is erected: That Governments have powers only as they are delegated by the People.

It is maintained that: 1. The treaty-making powers delegated under the Constitution to the President and Senate are a definitely limited power; 2. All treaties which concern matters for which legislative power is expressly and distinctly granted to Congress must be approved by Congress; 3. Agreements and compacts with foreign Powers must receive the consent of Congress; 4. All cases in law and equity arising under treaties made shall be judged by the Supreme Court; 5. The power to enter into Alliances and Confederations is expressly and distinctly reserved to "We, the People of the United States."

As if to emphasize and justify the limits imposed upon the treaty-making powers granted by "We, the People" to the President and Senate under our Constitution, the following is quoted from Washington's letters, edited by Jared Sparks:

A copy of Washington's Farewell Address printed in Claypoole's *American Daily Advertiser* of 19 September, 1796, has endorsed the following words in Washington's handwriting, which were designed as an instruction to the copyist, who recorded the Address in the letter book.

"The letter contained in this gazette addressed 'To the People of the United States' is to be recorded, and in the order of its date. Let it have a blank page before and after it, so as to stand distinct. Let it be written with a letter larger and fuller than the common recording hand. And where words are printed with capital letters, it is to be done so in recording and those other words, that are printed in italics, must be scored underneath and straight by a ruler."

Washington's Farewell Address consisted of about 5,800 words. The words emphasized in that address as per the marginal instructions to the copyist were as follows:

North, South, East, West, secure, outlets, one nation, Geographical, Northern, Southern, Atlantic, Western, desert, constantly and political.

All with the exception of constantly and political were specially marked to emphasize the principe of unity into one nation and one country. The following quotations from the farewell address show how constantly and political were used as underlined.

"Against the insidious wiles of foreign influence I CONJURE YOU TO BELIEVE ME, FELLOW CITIZENS, the jealousy of a free people ought to be *constantly* awake; since history and experience prove, that foreign influence is one of the most baneful foes of Republican Government.

"The great rule of conduct for use, in regard to foreign nations, is, in extending our commercial relations; to have as little *political* connection as possible. So far as we have already formed engagements, let them be fulfilled with perfect good faith. Here let us stop."

DISCUSSION

Officers for Shore Duty Only

(See Page 1865, Whole No. 226)

Mayor General C. C. Williams, U. S. Army—In the December issue of the U. S. Naval Institute Proceedings appears an article under the subject "Officers for Shore Duty Only," and I feel it incumbent on me to call attention to certain statements which are so in error that I am confident the author will desire to correct them, especially as they reflect unjustly on a service of which in the nature of things he must have not more than a casual knowledge.

To be specific, on page 1889 this statement is made:

> That the Ordnance Corps designed and built the guns and mounts with practically no attention to suggestion from artillerists of long experience; provided slow and antiquated methods of loading and handling the mechanism long after the navy and foreign gun builders had brought their guns up to date, and as a crowning achievement accomplished the feat of so redesigning the French 75, which had stood the test of four years of war, as to prevent the arrival of a single battery of American built 75's at the front before the Armistice.

The reference is here to the Ordnance Corps or Department of the Army.

The latter part of this statement is so contrary to actual fact that it comes as a distinct shock to those officers who yet have a vidid recollection of the struggle with manufacturers who urged time and again that the French 75 be made under Americanized drawings with many modifications. To insure interchangeability with the same type of material made abroad, authoritative instructions were sent from the A. E. F. and enforced by the War Department that the French drawings and even materials of construction be adhered to with the utmost closeness.

Any departures which exist are entirely trivial, do not effect interchangeability and were in every case based entirely upon the request of the manufacturer and upon his demonstration that production would otherwise be delayed. As a matter of fact, we will never know whether production would not have been faster if the procedure condemned by the author had actually been followed, and certainly those who did make the material would have preferred this procedure.

With regard to the first sentence of the quotation, it should be appreciated that ninety per cent of the guns and carriages now installed in our seacoast fortifications have been in service twenty years or more, and that most of this armament is of models 1890 to 1896. This armament is

still serviceable within the limitations as to caliber and range, and all of these carriages permit a high rate of fire of two or more shots per minute. It is quite evident that this armament should not be compared with more modern seacoast or naval armament. However, it is rather remarkable to note that the rate of fire, which in the final analysis gives a true measure of the method of loading and maneuvering, still compares very favorably with that of the most modern seacoast or naval armament.

Are Corps Needed in the Navy

Amalgamation and Specialists Versus Corps

(SEE PAGE 1209. WHOLE NO. 222)

CAPTAIN ELLIOT SNOW, (CC) U. S. N.—The article contributed by Commander J. O. Fisher, U. S. Navy, to the August NAVAL INSTITUTE PROCEEDINGS[1] states in several places that the navy needs no corps and further has as a complete background the idea of amalgamation; the arguments he offers in support of these statements are far from being convincing, except perhaps to himself alone.

The lack of conviction on my part arises from the fact that the subject matter is presented in such an obscure manner as to lead me to think that his own thoughts on the subject are quite hazy, and because the arguments he alleges to be those of the Staff Corps are very far from those advanced by many in those corps.

Although the thoughts contained in the article are often not sufficiently clearly expressed to permit of complete detailed analysis, this does not constitute a valid reason why the entire article should be allowed to pass without comment. Comment by one who holds a contrary view should be placed on record in the NAVAL INSTITUTE PROCEEDINGS because the views expressed in this article and those which appeared in the December PROCEEDINGS[2] if allowed to gain ground, will contribute their weight, however small that may be, toward a most undesirable condition—the lessening of the control of the Secretary of the Navy over the navy. What other form of control may grow up as a result of such a condition remains to be seen. To assist in avoiding even one step being taken in the direction of creating a sentiment in the service in favor of amalgamating the Construction Corps and the Line is the object of these comments.

There are good reasons for the existence of Corps in the navy and these groups of officers, instead of subtracting from the central authority, the Secretary of the Navy, add much strength to that office. This presupposes efficient administration by the Bureaus on the one hand and on the other that the corps are wisely controlled. In short, efficient and loyal corps that honestly endeavor to promote the interests of the navy by dis-

[1]Amalgamation and Specialist versus Corps, by Commander J. O. Fisher, U. S. N.—NAVAL INSTITUTE PROCEEDINGS.

[2]Officers for Shore Duty Only, by Captain E. P. Jessop, U. S. N.—U. S. NAVAL INSTITUTE PROCEEDINGS, Vol. 47, Whole No. 226.

interestedly supporting each other in their particular lines of work. I wonder if the author really believes that those who advocate corps in the navy are actuated by the sordid motive of a lust for power at the expense of the good of the service.

The comments which follow will be better understood by those who take the trouble to read them if the meanings of a few words are now defined. These are "operate," "control," "activity," "function," and "executive."

To operate means to work.
To control means to exercise restraining or governing influence over.
An activity, as used by the author, evidently means a kind of work.
A function is a kind of work—an activity—appropriate to any office, business or profession.
The adjective "executive" is usually coupled with the word "authority" and means power to enforce.

The reader of these comments should also bear in mind the following statements of the author concerning the composition of the navy.

> "13. The navy consists of (1) the fleet and (2) the shore establishment; and,
> "14. A fleet is divided into battleship, cruiser, destroyer, submarine, mine and air forces and the train."

Clearly these various forces and the train are composed not only of ships but as well of the personnel attached to those ships. The "shore establishment" is therefore by implication the entire personnel and material of the navy not included in the fleet.

An inquiry into the statements made by the author regarding corps organization, is now in order. In the article he defines a corps as being:

> "an organization of individuals under the law centering in a Bureau and controlling special activities in the shore establishments for which the Bureaus' appropriation may be expended."

Under this definition, Line officers are a corps of the navy. As a matter of fact, they are the Operating Corps of the Navy,—but they, however, perform other functions as well in two material bureaus.

They are an organization of individuals which, under the law, centers in more than one bureau (though this is not their sole work) and which controls special activities in the shore establishment for which bureau appropriations may be expended.

Notwithstanding his own definition and its logical inclusion of the Line the author states[3] that the navy needs no corps as a corps. Either his definition is wrong or his statement is at fault.

Again the author states:

> "We need no corps, or other organization of individuals in the navy to substract, from central authority."

All persons in the service and out of it should heartily agree with this, but whilst so agreeing should ever remember that the central authority in

[3] Page 1218, par. 43, lines 9 and 10.

the navy does not reside in a corps of the navy: it resides in the Secretary of the Navy. All corps of the navy, the Operating Corps and all other corps should work under the central control of the Secretary of the Navy. This is necessary to insure that the navy will at all times perform its full mission. To successfully accomplish this, the defense of the United States, all corps should admit and recognize the function performed by the Line and so correlate their work as to strengthen its performance. This can be done by giving the Operating Corps the best possible tools with which to do its work. A reciprocal duty rests on that corps to admit and recognize the need for the existence of other corps and to correlate its work with theirs. Wisdom dictates that the house be not divided against itself. The navy, like the body, is not one member but many. Can the head say to the arm, "I have no need of you," or if the hands shall say, "Off with the head," shall it be! Those members of the body which *seem* to be more feeble, are necessary.

Inasmuch as the Line is a corps of the navy, the Supply Corps another, the Aeronautical Corps another, and the Medical Corps another, is it a fact that the fleet contains no corps[4] and that no corps exercises a restraining or governing influence over any kind of work in the fleet?[5] Clearly, the personnel of the fleet must be paid, clothed, fed and receive medical attention and the vessels of the fleet must be built and kept in condition.

Are there no kinds of work in the navy which are not duplicated in the fleet?[6] Does the fleet make chain, rope, clothing, powder, build ships, dock them, operate a wind tunnel or a model basin? All these and many more kinds of work are done in the navy that are not duplicated in the fleet.

Let us now examine whether or not the views expressed in the article about specialists are equally at variance with logic or facts. A speicalist is defined thus:

> "A specialist is an officer with special training, knowledge and experience in one of the many activities of the navy."

How then is it possible that mere assignment to duty can make an officer a specialist?[7] An assignment to duty simply affords an officer the opportunity to become a specialist, but he obviously can not become one unless he continues the work long enough to acquire the requisite knowledge, training and experience.

Officers (and men) with special knowledge, experience and training of all kinds are needed in the navy and always will be needed[8] and there are good reasons why specialists should be developed and their services utilized

[4] Page 1215, line 4.
[5] Page 1214, last line with definitions inserted.
[6] Page 1215, line 5.
[7] Page 1217, lines 8, 9, 10.
[8] Page 1219, par. 49, lines 1 and 2.

in the fleet and at the shore establishments.[9] Can it therefore reasonably be affirmed that it is of little importance what happens to specialists?[10]

Corps—and this term does not exclude the Line—as they actually exist in the navy but not as defined in the article, are simply groups of officers, most of whom are specialists in several lines of work. Their special training, knowledge and experience in the service have been acquired along allied lines of generally similar work. Ultimately this makes them expert in the performance of well recognized functions. These are of a military, sanitary, industrial, engineering, aeronautical, financial or other nature as imposed by modern conditions of human endeavor. Too minute subdivisions are not required in the service.

The individuals in any one of these corps could, within the limits of their natural intellectual endowments, have become equally as efficient officers in any other corps. In a number of cases I have no doubt personal predilections have not been realized until it has been too late to correctly choose the corps most suitable to their innate capabilities. Corps assignments should be made on a basis that would permit reassignments in the lower ranks.

In the article amalgamation is defined:

> "as being an organization in which junior officers are given training and experience along the broadest and most comprehensive lines of activity in the navy, *with opportunities for special education and training as they show inclination therefor,* and where senior officers in the navy with a broad general experience occupy positions as commanding officers and as administrative officer[11] in the shore establishment all under a single control with undivided authority and responsibility for the efficiency of the navy."

If I correctly interpret this definition of amalgamation, as to its effect on the Construction Corps, it means a complete coalescence of the Construction Corps and the Line; the complete uniting together into one body of a design and production corps, composed of a group of officers whose education and special training and experience are essentially along industrial lines which best fit them for shore establishment control and an operating corps whose education, special training and experience are essentially along military lines which best fit them for controlling the operations of the fleet. There are three grounds, two of which are closely related, upon which amalgamation may safely be advocated. First, it must be shown not by *á priori* argument, but from past experience, that the Construction Corps has failed to efficiently perform its work; second, it must be shown that it has so failed because its personnel is grouped into a corps. Third, it must be shown, without a reasonable doubt, that the personnel of the Operating Corps, if it disperses its attention over many

[9] Page 1211, par. 12, lines 1 and 2.
[10] Page 1219, par. 47, line 1.
[11] A slight change in the original text has been made in the three preceding words.

more subjects, will then be of *higher average ability*. Is it possible for the Line as a corps to give sufficient time to become proficient in the industrial problems of the control of civilian labor and the design and construction of vessels and their fittings and equipment, and do this without at the same time deducting and thus losing an equal amount of time that should be devoted to the line of work appropriate to their profession? I am unable to believe that the Line as a body, or even a large percentage of individuals in that corps, has any spare time to devote to such matters. The navy needs to be guided by experts and not by dilettantes.

A fair and impartial comparison of the types and numbers of our vessels today, as regards their design, construction and equipment, with those that have existed at each decade back to the days of the White Squadron in 1889 will show that the Construction Corps has not failed to keep pace with the needs of the operating personnel, nor has it ever retarded that pace.

Can it be shown that amalgamation will in the next forty or fifty years insure a greater material improvement in proportion to the money and effort expended in the design, construction, and equipment of our naval vessels, than has been achieved in the last third of a century by the Construction Corps?

Since the first and second reasons for amalgamation can be shown not to exist and as the third looks to be most doubtful of proof without experiment, will the service consent to another experiment such as the amalgamation of the Engineer Corps with the Line? The effect of this is now being manifested; the reason this was not felt sooner can be very simply explained. In all enduring organizations as large as that of the navy, a momentum exists due to the length of life of individuals that form a part of it and to the fact that established systems of procedure and precedent which exist continue to be followed irrespective of the type of organization under which they were developed. This momentum continues to be felt for about thirty years after a change of organization is made. The remarks I have once before made on this subject are equally pertinent here.

> "There are many seagoing officers who consider the present engineering conditions as distinctly susceptible of improvement. It occurs to me to ask, assuming present engineering conditions and the existence of a separate Engineer Corps as in 1899, would there not be a much better chance of improvement if constructive criticism and insistent demands for improvement were made by the operating officers?[12]"

What is the present conditon of our ships as regards engineering? Have they been improved by reason of the extinction of the Engineer Corps? Has the average ability of the Line officers been raised by that amalgamation? The study of the past is the one safe guide in forecasting the future.

[12] Comments on "Officers for Shore Duty Only" which appeared in the February, 1922, issue of the PROCEEDINGS.

Are corps needed in the navy? I hold that they are, but they should exist without making any distinctions as to relative or absolute rank. In a navy without this distinction, the assignment of younger officers to sea and shore duty in various corps would be possible without endangering their future prospects for the attainment of rank and the performance of highly distinctive service. When they arrive at an age when their natural inclinations or predilections for service are known they can safely and wisely be permanently assigned to that corps in which they will become experts and be of the greatest value to the service.

Instead of abolishing any more corps, rather let the service frankly discuss the alternatives of re-establishing an Engineer Corps, of creating an Ordnance Corps, of retaining the Aeronautical Corps, and of increasing the Construction Corps, so that more members of that corps may be available for tours of duty at sea. *In doing so, absolute instead of relative rank should be given to all, but at the same time the command afloat and the control in operations should rest with the Operating Corps.*

The arguments for corps in the navy are not the flimsy ones advanced and so frequently reiterated by Commander Fisher; they are not based upon a belief that officers could not have attained equal skill in other corps; still less are they bred by a sordid lust for power. The real arguments for corps are these: First, an unshakeable belief that amalgamation will surely stifle honest constructive criticism in the service; second, that amalgamation will pave the way to an industrial breakdown in the service in time of war; third, without corps the effective control of the navy—the fleet and the shore establishments—by its real head, the Secretary of the Navy, will be rendered well-nigh impossible.

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Prize Essay Contest

After carefully considering the articles published in the Institute during the year 1921, the Board of Control, finding none of sufficient merit to warrant winning the prize, awarded Honorable Mention to the three following:

"A Study of Our Navy Personnel Situation," Captain J. K. Taussig, U. S. Navy.

"Naval Aviation and a United Air Service," Captain T. T. Craven, U. S. Navy.

"Leadership," Captain R. D. White, U. S. Navy.

Membership

Life, regular and associate, 4856.

New members, 18. Resignations, 132.

Deaths, 5:

Lieut. H. M. Ingraham, U. S. Navy.
Lieut. W. M. Derby, Jr., U. S. N. R. F.
Lieut. H. H. Morse, U. S. N. R. F.
Lieut. S. A. Forter, U. S. N. R. F.
Mr. George B. Beale.

Practically the whole service receives the benefit of the PROCEEDINGS, yet many officers who read it monthly are not members, and therefore contribute nothing to the support of the Institute.

Members are requested to urge non-members to join. Publication costs are now so high that the Institute is carrying a loss. The cost, per member, however, decreases with an increase in membership.

Dues

The annual dues ($3.00) for the year 1922 are now payable.

Regular and associate members of the U. S. Naval Institute are subject to the payment of the annual dues until the date of the receipt of their resignation.

Discussions Discussion of articles published in the PROCEEDINGS is cordially invited. Discussions accepted for publication are paid at one-half the rate for original articles, or about $2.25 a page.

Address of Members To insure the delivery of the PROCEEDINGS and other communications from the U. S. Naval Institute, it is essential that members and subscribers notify the secretary and treasurer of every change of address, without delay.

Book Department *The Institute Book Department will supply any obtainable book, of any kind, at retail price, postage prepaid.* The trouble saved the purchaser through having one source of supply for all books should be considered. The cost will not be greater and sometimes less than when obtained from dealers.

The Boat Book, 1920, and *The Landing Force and Small Arms Instructions,* 1920, are now ready for issue. The price of the former is $.50 and the latter $1.00 per copy.

Index to Procedings The attention of readers of the PROCEEDINGS is invited to the classified analytical index for numbers 101 to 200 inclusive, which is noticed under "Publications." This is a most complete index, which has been prepared at considerable expense in order to make readily available the information contained in both the articles and the notes of these issues. Only a limited number of copies have been printed. Price, bound in cloth, $2.35; bound in paper, $1.85.

Articles The Institute desires articles of interest to all branches of the service, including the reserve force. Attention is invited to the fact that the submission of articles is not limited to members, and that authors receive due compensation for articles accepted for publication.

All articles and discussions submitted by persons belonging to the navy for publication in the PROCEEDINGS must be in duplicate, one copy being signed by the author, which will be submitted to

the navy department when the original is published, as required by General Order No. 46, of May 20, 1921.

Reprints of Articles The attention of authors of articles is called to the fact that the cost to them of reprints other than the usual number furnished, can be greatly reduced if the reprints are struck off while the article is in press. They are requested to notify the secretary and treasurer of the number of reprints desired when the article is submitted. Twenty copies of reprints are furnished authors free of charge.

Illustrations Authors of articles submitted are urged to furnish with their manuscript any illustrations they may have in their possession for such articles. The Institute will gladly co-operate in obtaining such illustrations as may be suggested by authors.

Original photographs of objects and events which may be of interest to our readers are also desired, and members who have opportunities to obtain such photographs are requested to secure them for the Institute.

Notice Whole Nos. 6, 7, 10, 13, 14, 15, 17, 144, 173 and 194 of the PROCEEDINGS are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 75 cents per copy.

ANNAPOLIS, MD., February, 1922.

INFORMATION INDEX

	PAGE
ADVERTISEMENTS, INDEX TO	I
PUBLICATIONS, U. S. NAVAL INSTITUTE	(2)
SPECIAL NOTICE	521
TOPICS FOR ESSAYS	523

BALANCE SHEET

FOR THE YEAR ENDING DECEMBER 31, 1921
U. S. NAVAL INSTITUTE

ASSETS

Cash			
Farmers National Bank		$ 4,499.71	
Savings Banks		16,541.74	$ 21,041.45
Accounts Receivable			
Dues		3,142.18	
Subscriptions		22.10	
Advertisements		717.13	
Various Dealers		17,373.94	21,255.35
Other Assets			
Bonds		102,587.39	
Inventory		34,686.33	
Prepaid Royalty		291.29	
Furniture and Fixtures	$2,915.66		
Less Depreciation	291.56	2,624.10	
Prepaid Expense		1,154.36	
Authors Rights		2,964.41	
Refunds		2.70	144,310.58
TOTAL ASSETS			$186,607.38

LIABILITIES AND NET WORTH

Accounts Payable			
Lord Baltimore Press		$4,369.98	
Various Dealers		326.55	
Accrued Royalty		86.48	$ 4,783.01
Prepayments			
Dues		963.40	
Subscriptions		1,076.55	
Sundry		88.07	2,128.02
TOTAL LIABILITIES			$ 6,911.03
Reserves			
Reserve Fund, December 31, 1920		$ 8,684.09	
From Profits		160.00	
Transferred from Surplus		120.00	
		8,964.09	

Reserve Bad Debts	$ 560.27		
Charged Off	5.76	554.51	
Surplus			
December 31, 1920	162,720.86		
Transferred to Reserve Fund	120.00		
	162,600.86		
From Profits	7,576.89	170,177.75	
NET WORTH			179,696.35
TOTAL LIABILITIES AND NET WORTH			$186,607.38

PROFIT AND LOSS STATEMENT
FOR THE YEAR ENDING DECEMBER 31, 1921
U. S. NAVAL INSTITUTE

TRADING

Institute Publications			
Sales	$56,454.89		
Income Advertisements	230.00		
Total Income Institute Publications		$56,684.89	
Purchases	$28,145.12		
Add Inventory, Jan. 1, 1921	30,206.65		
	58,351.77		
Deduct Inventory, Dec. 31, 1921	32,609.62		
Printing Cost of Sales	25,742.15		
Add Royalty	5,084.23		
Total Cost of Sales		30,826.38	
Trading Profit			$25,858.51
Purchased Books			
Sales	5,611.59		
Purchases	4,647.83		
Inventory, Jan. 1, 1921	230.00		
	4,877.83		
Inventory, Dec. 31, 1921	946.01		
Cost of Sales	3,931.82		
Profit on Sales			1,679.77
			$27,538.28
Proceedings and Index			
Sales	712.71		
Income Dues & Subscriptions	18,129.46		
Advertisements	3,554.89		

Binding	64.00			
Life Fees	160.00	21,908.26		
Total Income		22,620.97		
Purchases	27,823.83			
Deduct				
Inventory, Dec. 31, 1921	1,130.70			
	26,693.13			
Envelopes	771.45			
Discount	52.22			
Members (Dropped and Resigned)	2,330.61			
Contributors	4,630.68			
Prize Essay Awards	426.50	34,913.59		
Loss on PROCEEDINGS				12,292.62
Trading Gain				15,245.66
OPERATING EXPENSE				
Postage	1,668.44			
Advertisements	776.56			
Office Expense	1,394.67			
Salaries	12,380.50			
Express & Hauling	458.29			
Board Meetings	1,353.92			
Insurance	14.40			
Gratuities	91.00			
Depreciation	291.56			
Cost Collection	3.75			18,433.09
Operating Loss				$ 3,187.43
SUNDRY INCOME AND EXPENSE				
Interest	5,904.44			
Less Interest Paid	345.97	5,775.62		
Profit on Bond Sale	765.00			
Less Loss on Bond Sale	345.97	419.03		
Appreciation Bond Value		4,677.50		
Sundries		52.17		10,924.32
Profit for Year				$ 7,736.89
Profit Transferred to Reserve Fund			$ 160.00	
Profit Transferred to Surplus			7,576.89	7,736.89

CHANGES IN NET WORTH

FOR THE YEAR ENDING DECEMBER 31, 1921
U. S. NAVAL INSTITUTE

ASSETS

	Dec. 31, 1920	*Dec. 31, 1921*	*Increase*	*Decrease*
Cash Farmers National Bank	$26,990.84	$ 4,499.71	$.....	$22,491.13
Cash Savings Banks	20,203.24	16,541.74	.....	3,661.50
Dues Receivable	4,929.99	3,142.18	.....	1,787.81
Advertisements Receivable	313.78	717.13	403.35	.....
Subscriptions Receivable	36.97	22.10	.....	14.87
Accounts Receivable	6,895.80	17,373.94	10,478.14	.....
Bonds	97,640.62	102,587.39	4,946.77	.....
Inventory of Books	30,436.65	34,686.33	4,249.68	.....
Prepaid Royalty	108.23	291.29	183.06	.....
Furniture & Fixtures	1,841.70	2,915.66	1,073.96	.....
Prepaid Expense	917.64	1,154.36	236.72	.....
Refunds Receivable	.....	2.70	2.70	.....
Authors Rights	.....	2,964.41	2,964.41	.....
Totals			$24,538.79	$27,955.31

LIABILITIES

			Decrease	*Increase*
Depreciation Furniture & Fixtures	$.....	$ 291.56	$.....	$ 291.56
Accounts Payable Lord Baltimore Press	14,844.83	4,369.98	10,474.85	.....
Accounts Payable Miscellaneous	448.11	326.55	121.56	.....
Royalty Payable	431.92	86.48	345.44	.....
Prepaid Dues	1,289.04	963.40	325.64	.....
Prepaid Subscriptions	1,176.61	1,076.55	100.06	.....
Prepaid Advertisements	75.00	.....	75.00	.....
Miscellaneous Overpayments	84.73	88.07	.....	3.34
Reserve for Bad Debts	560.27	554.51	5.76	.....
Totals			$11,448.31	$ 294.90
			35,987.10	28,250.21
Year's Profit				7,736.89
			$35,987.10	$35,987.10

Audited and Found Correct

JOHN DOWNES, *Commander, U. S. Navy.*
J. O. RICHARDSON, *Commander, U. S. Navy.*
H. D. COOKE, *Commander, U. S. Navy.*
Auditing Committee

Approved by the Board of Control, February 15, 1922.
F. M. ROBINSON, *Lieutenant Commander, U. S. Navy,*
Secretary and Treasurer.

PROFESSIONAL NOTES

PREPARED BY

LIEUTENANT R. A. HALL, U. S. Navy

GENERAL ARRANGEMENT

VESSELS BUILDING, NAVAL POLICY, MATERIAL, PERSONNEL, MERCHANT MARINE — France ... 455; Germany ... 457; Great Britain ... 459; Japan ... 465; United States ... 468
TEXT OF ARMAMENT TREATIES ... 476
AERONAUTICS ... 490
ENGINEERING ... 494
NAVIGATION AND RADIO ... 497
ORDNANCE ... 503
MISCELLANEOUS ... 503
CURRENT NAVAL AND PROFESSIONAL PAPERS ... 506

FRANCE

WORK ON FRENCH WARSHIPS.—Although the French naval programme was adopted last April, it is not believed that work has been begun on any of the ships which were voted. The programme of new construction embraces six cruisers, twelve large and twelve medium destroyers and thirty-six submarines, and authorises the conversion of the uncompleted battleship *Béarn* into an aircraft carrier. Building operations will probably commence at an early date, for on December 9 the Chamber voted the sum of 160 million francs for disbursement on new construction during 1922. The six cruisers have been re-designed on a larger scale. They will displace 8000 tons and have a speed of 35 knots, while the armament will consist of a new mark of 7.6-in. gun, of very high velocity. A complete armour belt and strong deck protection will be fitted. These will be the first light cruisers to be built for the French navy for well over twenty years. The twelve large destroyers will be of 2400 tons displacement, and the twelve medium boats of 1400 tons. The displacement of the thirty-six submarines is expected to average 1000 tons. A large amount of reconstruction work was done during the past year, the vessels so treated including three battleships and the five ex-German light cruisers surrendered to France under the Peace Treaty. The destroyer *Enseigne Gabolde*, laid down in 1913 but on which work was suspended during the war, was launched on April 22.—*The Engineer*, 13 January, 1922.

FRENCH DOCKYARDS.—The Minister of Marine has introduced a bill in the Chamber for the reorganization of the naval dockyards, of which only two, Brest and Toulon, are to be kept up under present conditions.—*Naval and Military Record*, 4 January, 1922.

FRENCH GOVERNMENT AND AERIAL BUDGET.—Last week the votes for the Air Budget were passed by the French Chamber, the chief items being: subsidies, 46,389,000 frs.; aerodromes, 36,690,000 frs.; reserve training, 3,345,000 frs.; specific work and expenses, 86,405,000 frs. Curiously the Chamber of Deputies so far has not renewed the credits for the Air Attachés in London, Washington, Rome and Peking.—*Aerial Age Weekly*, 16 January, 1922.

FRENCH NAVY IN 1921.—The war has demonstrated that the quality of naval weapons was of higher moment than either their number or size, and, therefore, that continuous improvement on scientific lines was the safest and most economical means of attaining that superior efficiency that counts for more than apparent strength. A long series of realistic experiments (in the Tempête, Terrible, Fulminant, Tonnerre, Neptune, Hoche, Jéna, etc.) gave France her *"obus alourdi,"* the best projectile in existence, whilst lack of experiments with torpedoes caused France to enter the war with inferior submarine weapons. No wonder, with these facts in mind, Minister Guist'hau decided to widen the scope of the comprehensive experiments projected by his predecessors. If financial difficulties stood in the way of France regaining the ground lost during the war, an effort at least should be made to restore old Gaul to that position of technical supremacy which she has oft occupied in the course of her long naval history, that started seven centuries before any mention was made of either an American or of a Japanese fleet.

The eight-week experiments in the ex-Boche battleship *Thüringen*, that had several times to be patched up and refloated, had, of course, for object the testing of the practical solutions which French artillerists have given to the several new ballistic problems revealed by the war, viz., the penetration and smashing power of ordinary heavy shells striking thin and thick armour under wide angles of incidence, the defensive value of super-imposed decks, the best protection for ammunition bunkers (a study of the *Coronel* and *Jutland* mysteries), the comparative worth of new 13-4-inch shells at all angles, without mentioning the experimenting with various chemical shells and with the new devices to render night firing effective at long range. The results are said to have been most gratifying and to have confirmed Paris experts in the belief that they are working in the right groove, and notably that the new 18-inch guns, shortly to be tested at Gâvres, represent an advance over all comers. The Paris "Yacht" predicted some time since the fitting of six of these powerful monsters in battleships of just over 30,000 tons, and it is possible that plans have already been prepared to that effect by the Section Technique. The Washington comedy, that will bind France just in the measure in which the solemnly-signed Versailles Treaty has bound America, is not so much an obstacle to the construction of such battleships as is the actual popular reaction against the much-slandered mastodon. But the construction of these super-calibre guns is to be continued, their 50,000 metres effective range and the power of their 3,600-lb. shells suiting them for more than defensive duties, in co-operation with submarines and seaplanes, and being likely to persuade any hostile armour-clad to give a wide berth to Gallic coasts.

The question of super-cannon is also known to have been studied by Gallic artillerists, although no tangible results have come to light, which justifies to a certain extent the complaint of pessimistic critics that Bocheland is still retaining the supremacy of range with her Berthas and improved Berthas, the secret of which may not have been so fully found out as has been asserted in some quarters. Indeed, it will not pay to sneer at these "baby-killing weapons," advantage of range being a capital

asset. As a matter of fact, it is the knowledge that they possessed such an advantage that caused the Germans to make war both in 1870 and in 1914.—*Naval and Military Record*, 18 January, 1922.

GERMANY

GERMAN WARSHIP BUILDING IN 1921.—The keel of a new light cruiser for the German navy was laid at Wilhelmshaven. The vessel is to be of 5600 tons displacement, and is designed for a speed of 30 knots. The armament will be eight 5.9-in. guns and four torpedo tubes.—*The Engineer*, 13 January, 1922.

GERMANY IS CONVERTING HER WARSHIPS INTO FREIGHTERS.—The question as to whether it is feasible to convert warships into merchant vessels has been answered in a practical manner in Germany, where cruisers have been successfully made into freighters. In the United States expert opinion has been divided on the subject, the consensus being, however, that while it is impossible to convert capital ships, cruisers might be reconstructed so as to make them suitable for service in the merchant marine. . . .

Under the terms of the Versailles Treaty Germany was confronted with the necessity of finding some method of disposing of her war tonnage, and shipbuilders and naval architects immediately sought for ways and means of utilizing these ships for commercial purposes rather than to relegate them to the scrap heap. A practical solution was ultimately found, with the result that several of these cruisers were placed in German shipyards and rebuilt into freighters which are now doing good service in such capacity.

With her wide experience in dismantling and breaking up discarded warships, combined with low labor costs, Germany has become the logical center in Europe for the scrapping of warships. England, Russia and France are negotiating with German yards to break up old warships, and reports state that thus far the British have contracted for the destruction in Germany of six obsolete battleships, eight cruisers and twelve destroyers. Britain expects this tonnage to yield a clear profit to them of forty shillings per ton over the expenses of taking the ships to German ports and the cost of destruction. On ships broken up in England the Admiralty loses money, the price of scrap metal being inadequate to cover labor costs. Ten obsolete warships owned by the Soviet Russian Government have been sold at a profit to German firms for destruction.

Germany is eager for this work on account of the high prices prevailing in that country for scrap metal.—*Nautical Gazette*, 7 January, 1922.

GERMAN SHIPBUILDING INDUSTRY.—Economic conditions in Germany during the past year, so far as the shipping and shipbuilding industries are concerned, have differed from those pertaining in every other country throughout the world. The freight crisis has had considerable influence on German shipping interests, but the situation has been more favourable for the development of the mercantile marine than in other countries, as the costs of running vessels have been less than in the case of ships under other flags owing to the depreciation of German money value. Shipowners in Germany, therefore, have been able to spend some money on new tonnage.

The mainstay of German shipbuilding, however, has been the Indemnity Law. During the war, and for some time afterwards, the Government agreed to compensate shipowners for all their losses resulting from the war. Unfortunately, this arrangement could not be continued when shipbuilding costs rose higher and higher, and at the

beginning of 1921 an arrangement was arrived at by which a compromise was made in regard to all the claims of the shipowners. This settlement was a great disappointment to shipping and shipbuilding interests, as the sum destined for the reconstruction of the German mercantile marine was restricted to 12 milliards of marks. Under the new arrangement shipowners were called upon to build up a merchant fleet with a total deadweight-carrying capacity of 2,500,000 tons, which is only about one-third of the tonnage owned in Germany in 1914. Another condition was that a considerable percentage of the cost of building should be borne by the shipping companies. The work of construction was to be spread over five years; and as about five milliards of the total of 12 milliards of marks had already been spent at the beginning of 1921, only the balance of some seven milliards was available for expenditure during the period named. Even this arrangement only received the sanction of the Reichstag in view of the fact that the sum voted would provide work, and thus stem the tide of unemployment. As shipbuilding costs continued to rise steadily, it soon became apparent that a considerable restriction of output was inevitable.

The facts mentioned above have naturally influenced the total volume of tonnage launched from German shipyards during the past year, which may be estimated at about 330,000—350,000 gross register tons. No official reports have been issued up to the time of writing. A small portion of the indemnity granted by the Government, viz., 10 per cent., was made available for purchasing tonnage from other countries. This condition has been taken advantage of, and moreover German shipowners have used some of their own funds for the same purpose, especially in repurchasing their old ships from the Allies.—*The Shipbuilder*, January, 1922.

GERMANY IS DISARMED.—Whether Germany has accomplished "moral" disarmament or not, there can be no question that she has carried out to completion the material disarmament demanded at the Armistice and at Versailles to completion. If today she were morally war-minded, and if she were not disarmed, the threat of war would still be present. But Germany, so far as any military operations is concerned, is so completely bereft of armament, that any military man, basing his statements upon the facts as they are and as they are known to be, will tell you that, for all her seven million men of fighting age, she is not only incapable, today, of military operations, but of necessity must remain so for a long period to come.

Modern war is an engineer's job. It is a matter of mechanical appliances produced on an enormous scale and wielded by a highly trained army of mechanicians. Destroy the mechanism of war and you have destroyed the possibility of war so far as a disarmed people is concerned.

Thanks to the Conference at Washington, we have laid the bugaboo of Japanese navalism. It remains for the Conference, or a similar one, to lay the bugaboo of an ever-present German militarism. The question is: Has Germany disarmed, or has she not?

The answer to that question is to be found in a review of the work of the Interallied Commission on Military Control, with headquarters at Berlin, which was printed in a recent issue of the *New York Times*, in which it is stated that both in respect to munitions of war and of establishments devoted to their manufacture, Germany today is from ninety to ninety-five per cent disarmed. Field and heavy artillery is too bulky for successful concealment; and we have noted that occasional official reports during the past half year have stated that all of the German war material of this character is accounted for. Of the celebrated *minen-*

werfers, 11,579 have been surrendered, 11,489 have been destroyed, and 90 remain. Machine guns and rifles are, of course, easier of concealment; yet the surrender and destruction of these have been on an enormous scale, including 86,505 machine guns surrendered and 84,108 destroyed, with 2397 remaining. Of rifles and other small arms, 4,460,649 have been surrendered, 4,351,627 destroyed, and 109,021 remain. We are informed that this military disarmament has extended to field bakeries, field ambulances, field printing plants, armored trains, pontoons and bridging material, that it covers, in fact, everything conceivable to the military mind.

Not only has Germany surrendered or destroyed her finished military material; but of the 7000 manufacturing plants and factories which were known to have been engaged wholly or in part in manufacturing war materials, 5000, commencing with the great Krupp plant, have been demilitarized; and of the 2000 factories remaining, the majority are small and of very limited capacity. The Interallied Commission on Military Control has done this work of industrial disarmament so thoroughly that, in its opinion, fully two years would elapse before Germany could begin to supply munitions of war, even on a limited scale.

Shortly after the Armistice, we wrote in this paper that the very last thing the German people were thinking about was another war. We repeat that statement today, with a conviction which has been strengthened by the sweeping manner in which her disarmament has been carried through.—*Scientific American*, February, 1922.

SUBMARINES WHICH GOT HOME.—The difficulty which was experienced in the war in compiling accurate and reliable statistics of the anti-submarine results is recalled by the publication in the *Marine-Rundschau*, the German naval monthly review, of a series of personal narratives dealing with actions at sea. In one of these, reference is made to the British claim that *UC 79* was destroyed on Oct. 19, 1917. According to Oberleutnant Fritz Otto Busch, the boat was going for more than five months afterwards. "*UC 79*," he says, "set on 20.3.18, and did not return. Her former commander set out in *UB 58* on 9.3.18 and not return." *UC 79* was the vessel which was understood to have been destroyed by submarine *E 45*, Lieutenant-Commander G. R. S. Watkins, in the North Sea. Sir Henry Newbolt, in his book, *Submarine and Anti-Submarine*, relates how the German was caught red-handed in the task of destroying a Dutch steamer by means of gunfire. Commander Watkins fired his first shot at 400 yards and missed; altering course instantly, he fired again in three minutes, when a loud explosion was heard, and on coming to the surface again there was no trace of the "U" boat. If Lieutenant Busch is right, the boat must have managed to crawl home in a damaged condition. The results of submarine combats, as Mr. Balfour once said, varied from practical assurance down to faint possibility, and when even this one, a practical certainty, turns out otherwise it will be seen how difficult was the task of gauging precisely the effect of the anti-submarine war.—*Army, Navy and Air Force Gazette*, 7 January, 1922.

GREAT BRITAIN

FUTURE NAVAL CONSTRUCTION.—If there is one thing more than another which must have impressed itself upon the minds of naval officers in regard to the progress of the Washington Conference, it is that decisions have been arrived at and promulgated, not by the experts, but by the politicians. They have been reached, that is to say, less in accordance with actual or prospective needs than with the political exigencies of the moment. It is therefore well that there should be a survey of the present

state of naval construction from a professional standpoint. Such a survey is contained in an excellent paper by Sir George Thurston, of Messrs. Vickers, in the new *Cassier's Marine Number*. Sir George deals with the influence on naval construction, and the lessons, of the war, during which, he says, financial restrictions being largely removed, progress consisted principally in pressing home well-known principles to the extreme limits of scientific practicability. His paper, read in conjunction with those which Sir Eustace d'Eyncourt gave at the Institution of Naval Architects, brings out afresh what a wonderful achievement was that of our shipbuilders and marine engineers.

As a designer of capital ships, Sir George writes on this phase of his subject with an authority which is somewhat rare in recent discussions. Citing the Falklands—where the overwhelming superiority of the "Invincibles" over Von Spee practically annihilated the latter's squadron without loss to themselves—as "an excellent example of utilizing technical advantages to the maximum extent," he says that a vessel of the *Courageous* type (practically unarmoured) would have achieved precisely the same results; but to conclude hastily that this action justifies the omission of armour and protection in all future designs "would be to lose sight of the question of degree of visibility, which completely modifies the relative values of protection and primary guns." The uncertainty of this element, too vital to be ignored, necessarily exercises a very important influence on the distribution of the available weight between the two primary factors of heavy armament and speed in a design. It is also a reminder to us that ships would get out of date, even in a naval holiday, by changing political conditons altering the venue in which they would most likely require to be used. A vessel the tactical qualities of which were determined with a view to North Sea fighting would be unsuited for action across the long distances of the Atlantic or Pacific.

From many other points with which Sir George Thurston deals in his article, a selection may be made of his conclusion that there are no reasonable prospects of the introduction of a submersible battleship to replace the existing capital ship. How heavily the increased speed which submarines would need to keep up with surface units has to be paid for in other directions may be seen from his table comparing the particulars of the "K" class, of 24 knots, with the "Scott' class of destroyer, of 36 knots, and with a proposed 30-knot submersible. In the submersible, the speed, with 50,000 instead of 40,000 horse-power, is six knots less than in the *Scott*, and yet the latter has five 4.7 in. guns to the submarine's one 5. 5 in. The oil fuel capacity is about equal, but the dimensions of the under-water boat are 50 per cent. greater, and the displacement over 200 per cent. more—5,450 tons, as compared with 1,800. These illuminating figures show clearly how the quality of submergence can only be obtained by very heavy sacrifice in each of the other factors which determine an efficient surface fighting unit. The absolutely necessary increase in size is always accompanied by an appreciable fall in under-water speed. The final conclusion of Sir George is as follows:—

The termination of the world war marked the beginning of a new era in naval construction, and with respect to the future, in the comparatively short period necessary for reconstruction, the battle fleets of the world will, in certain respects, present a marked contrast to the fleets which took part in recent engagements, and contain important units and appliances as yet in embryo.—*Army, Navy and Air Force Gazette*, 14 January, 1922.

SMALLER SHIPS.—*Sir:* It is most sincerely to be hoped that the present opportunity of reducing the tonnage of fighting ships will not be missed.

It will never occur again. An acceptance of the possibility of placing a definite tonnage limit upon the largest class of ship, hitherto deemed impossible to impose, has been reached. The Powers have agreed that no ship of the future shall exceed 35,000 tons. This is of the highest value.

But why 35,000 tons? What is there in this number that is of importance? Why not 35,000, or 30,000, or 20,000, or 10,000? There is in reality no reason whatever for that figure. A fleet of battleships of 30,000 tons, opposed to another of the same tonnage, can produce no greater results than one of 10,000 tons against another of 10,000 tons. All you have is a bigger battleship. Not only are there no greater results, but the probability is that the results of an action between these immense, costly, irreplaceable ships will be smaller than those of lesser ships. Officers will be less inclined to risk them; and we shall get the same position as that of the army of the Potomac, of which Sheridan said that "the trouble was that the commanders never went out to lick anybody, but always thought first of keeping from getting licked." Was there not, indeed, something of this kind in the minds of the commanders at Jutland?

There is neither strategical nor tactical necessity for ships of this prodigious size. They are no more capable of performing the functions for which "battleships" are intended than would be vessels of, say, 10,000 tons. They cannot keep the sea any longer. They may be faster; but as the enemy's ship is likewise faster, there is nothing gained—they have no advantage over an equal enemy. The only reason they have been built has been that other people have built them, or that one desires to get an advantage over someone else by building a bigger and more powerful instrument. So we have progressed from the battleship of the nineties—a 14,000-ton ship—to the 42,000-ton *Hood,* and still we have only got a battleship, nothing more. The only difference is that we pay 10 millions for each unit instead of one. The growth in size of the ship has not increased the strength at sea of any Power. Science, so far from giving up more for our money, as it does in most activities of this world, gives us less. A ship that can do no more costs at least ten times as much.

But can this new type of ship do not only no more, but as much as her smaller predecessor? She has not greater powers of remaining at sea. She is not able to use the harbours that her predecessor could. She requires more supplies. She needs, just as much as they, an escort to protect her if she goes to sea. She cannot operate in some parts of the world because there are neither bases capable of taking her, nor docks. It is the same for all Powers concerned. We have all got bigger ships, but not one of us is one whit stronger than if we had never increased the size at all, since all have got them.

Now we have a chance of putting a stop to this foolish waste. Instead of putting the limit at 30,000, put it at, say, 10,000. That is sufficient to provide a ship that can go anywhere; and if no one is allowed to build a bigger, the need that forced competitors forward disappears. It has not been possible to do this before because of the impossibility of getting an agreement to limit size. Today all the Powers are eager to reduce expenditure, and here we have the easiest means in the world. What science will then do will be to make these 10,000 tons of metal go as far as possible in producing an instrument capable of performing the duties that have called it into existence.

For this a ten-years' holiday is essential. The old mastodons must not be replaced annually. Let them die out. The fear that armour-plate firms or others will suffer is a case of putting the cart before the horse.

Navies do not exist to keep armour-plate firms in existence; the reverse is the case. Moreover, by diminishing the size of the ship the call for armour-plates is sensibly diminished. The reduction in scale of the ship will also be a deterrent to anyone who is in a hurry to build; for, as she will be weaker than the present ship, no one will wish hastily to replace his present ships by smaller ones. The old ships will, therefore, be made to last as long as possible, all of which is a definite saving to the taxpayer, accompanied by no loss whatever in security.

No country would venture to go outside the limit of 10,000 any more than it will venture to exceed the 35,000 tons. How each navy utilized its disposable tons would be decided by its views as to strategy and tactics.

These are important points. There appear to be people who imagine that there is some military reason why a "battleship" should carry 16-in. guns, a mass of armour, and so forth. There is none. These guns and this armour have been introduced in the struggle to produce something more powerful than what is possessed by an enemy or possible enemy. This is not a military, but a mechanical, reason. Now that our statesmen are sitting round a table and discussing this in friendly fashion, eager to reduce the cost of defence, they have such an opportunity as has never occurred before. They have the people behind them. The sole qualifications of a ship of war are that she shall be able to go to sea and to fight. There is a limit in size below which she cannot do these things; there is also a limit beyond which it is quite unnecessary for her to go. I have suggested 10,000 tons, but this is guesswork—it may be 6,000 or 14,000. I am sure it is not more.

I am yours faithfully,

ADMIRAL.—*London Times*, 23 November, 1921.

FUTURE OF THE SUBMARINE.—The insistence by France on a submarine tonnage of 90,000 has apparently dissipated the hope that it might be possible, failing a policy of absolute prohibition, to limit the tonnage of submarines to be constructed by the naval Powers. Great Britain, as well as other nations, will be left with a free hand, and the new form of competition in naval armaments, although less costly than that in capital ship construction, may be as acute as any previous phase of warship building. It is probable, too, that the proportions of auxiliary craft to be assigned to the different nations may also prove a source of disagreement, and that no actual achievement will stand to the credit of the Washington Conference but the limitations of the numbers and tonnage of the big ship. It is possible that agreement even on this question may have been partly due to a belief that Sir Percy Scott's midshipman's estimate of the value of the big warship may be true in ten years' time. British policy appears to be quite clear. Our essential requirement is to keep the seas open to our merchant fleet, and if no agreement is reached with regard to submarines, it will be necessary for us to concentrate on the production of the most efficient submarine fleet and also on measures designed to protect our merchant fleet from submarine attack. On that subject we know more than any other nation, and it is now common knowledge that had the war been prolonged the U boat would have been driven from the seas. Assuming that we have forewarning of what might happen in another war, we are not likely to be caught napping.—*The Engineer*, 30 December, 1921.

BERMUDA TO ESQUIMALT.—The new epoch in naval strategy as regards North American waters which was opened by the completion of the Panama Canal may now be said to have been consummated by the voyage

of the *Raleigh* to Esquimalt. In this, her first visit to Pacific ports, the new flagship of Vice-Admiral Pakenham's squadron has shown what an advantage it is to have the use of the new waterway. In 1914 the Atlantic and Pacific coasts of Canada were completely divided as regards naval protection. Now one squadron is able to cover the interests of both seaboards. In 1914 we had to maintain on this side the cruiser squadron which was commanded by the gallant Sir Christopher Cradock, and on the Pacific coast, for station duties, the sloops *Algerine* and *Shearwater*. At the present time the residents of British Columbia can see for themselves, not a pair of small, obsolete craft, but a modern cruiser which, even though based on Bermuda, is within comparatively easy distance of them. Such vessels as the *Algerine* were quite useless for fighting purposes, and when war came had promptly to be paid off and their crews transferred to the *Niobe*. By doing away with the necessity of keeping such vessels in commission, the Panama Canal makes for economy as well as efficiency in our naval distribution. Its advantage to Canada is also shown by the fact that the cruiser *Aurora* and destroyers *Patriot* and *Patrician* can work together as one squadron, cruising from one side to the other as occasion requires, instead of having to be divided up like the *Niobe* and *Rainbow*, one in the Atlantic and the other in the Pacific.—*Army, Navy and Air Force Gazette*, 7 January, 1922.

CALCUTTA'S CRUISE.—For the cruise in the Pacific of the light-cruiser *Calcutta* (Capt. W. B. Compton), of the North American and West Indies Station, the following programme has been arranged, the vessel being due to return to Bermuda on May 14:—

Colon	Jan. 24
Panama	Jan. 25
San Pedro	Feb. 9
Honolulu	Feb. 21
Palmyra Islands	March 2
Washington Islands	March 3
Fanning Islands	March 4
Christmas Island	March 6
Honolulu	March 11
Hilo Hawaii	March 20
San Pedro	March 31
San Diego	April 1
Salina Cruz	April 11
San Jose	April 14
Libertad	April 19
Amapala	April 24
Corinto	April 26
Punta Arenas	May 2
Panama	May 8
Colon	May 8

—*Naval and Military Record*, 28 December, 1921.

OLD WARSHIPS SOLD.—Another large number of obsolete warships has been acquired for breaking-up purposes by a British firm, the Slough Trading Co., of London. The craft, to the number of thirty-one, are lying at the three principal naval ports, and consist of seven battleships, four cruisers, three light cruisers, three monitors, and other craft, including twelve destroyers. The vessels at Portsmouth are the battleships *Zealandia*, *Commonwealth*, and *Implacable*, the cruiser *Roxburgh*, the light cruisers *Fearless* and *Forth*, the monitors *Earl of Peterborough* and *Sir Thomas Picton*, and the patrol leader *Ithuriel*.

The vessels at Devonport are the battleships *Belleraphon* and *Cæsar*, the cruiser *Essex*, the light cruiser *Liverpool*, and the patrol leader *Marksman;* and those at Chatham are the battleships *Lord Nelson* and *Hibernia*, the cruisers *Carnarvon* and *Theseus*, and the monitor *Sir John Moore*. —*Naval and Military Record*.

UTILIZATION OF DISCARDED CAPITAL SHIPS.—A writer in a London paper suggests that capital ships of the great Powers, which have to be discarded according to the agreement approved by the Disarmament Conference, should not be scrapped but used as oil bunkering hulls after having been gutted out and dismantled. This proposal is endorsed by *Syren and Shipping* which says that the idea should commend itself, not only to the Admiralty, who are erecting big naval oiling stations at different places throughout the Empire, but also to the great oil companies, and to shipowners generally.

As oil-hulks the battleships and battle-cruisers would be much more valuable than as scrap, especially as they could be converted into the merest of shells, and all the machinery and fittings recovered. If the plan were adopted many of them could be utilized within a comparatively short time, and they would thus be of great advantage to shipping, and so indirectly to shipbuilding.—*Nautical Gazette*, 7 January, 1922.

EXPLOSIONS IN EX-GERMAN CRUISER IN TORBAY.—A series of explosions took place in the ex-German cruiser *Heligoland*, at anchor in Torbay, while steam was being raised for weighing anchor for continuance of towage to Liverpool, where the cruiser will be broken up. The explosions occurred under the boiler and completely wrecked it, seriously damaging another close by.

It is rumoured that all the English coal had been used, and the remnant of the German fuel in the bunkers, in which, it is stated, there was some ammunition, was being used. Another report attributes the explosions to the presence of chemicals in the boilers.

The explosions severely injured the chief engineer, Ari Verhey, a Dutchman, who was detained in Brixham Cottage Hospital.—*Naval and Military Record*, 4 January, 1922.

FUTURE OF HAULBOWLINE DOCKYARD.—While other dockyards are clamoring for Government work, Haulbowline will, in consequence of the new condition of affairs in Ireland, be vacated by the Admiralty. The yard will be stripped of all its machinery and handed over to the new Irish Government, and its future rôle is a matter of speculation. The large number of apprentices who were undergoing their training at Haulbowline will be transferred to English and Scottish naval dockyards.—*The Engineer*, 13 January, 1922.

WARSHIP BREAKS FROM TUGS.—During the storm in the Channel the obsolete warship *Vengeance* broke adrift from the three tugs that were towing her from Plymouth to Dover. A gale from the southwest was raging on Tuesday, when the *Crusade*, the *Gauntlet*, and the *Vanquisher* left Plymouth with the *Vengeance*. At 10:30 the same night the *Vengeance* broke adrift from the *Vanquisher*, whilst two hours later the *Gauntlet* lost her tow. At 11:30 a. m. on Friday during a heavy gale the *Crusade* also parted company with the old warship, which was then forty miles southwest of Portland.

The Channel cargo steamer *London Queen* put in at Cherbourg early on Friday to ask for help to be sent to the *Vengeance*, which she had encountered on her way from London to Guernsey, nine miles northeast of La Hogue Cape light, drifting and abandoned by her tugs.

The *London Queen* passed a tow line to the *Vengeance*, but it broke. The authorities at Cherbourg despatched tugs, and the vessel was towed into Cherbourg on Sunday.

The *Vengeance* was launched in 1899. She is a pre-Dreadnought battleship of 12,950 tons, belonging to the *Canopus* class. The *Goliath* and the *Ocean*, of the same class, were lost in the war.

The *Vengeance* served one commission in the Mediterranean and two on the China Station, and in 1905 was attached to the Devonport Reserve Division. In 1906 she was attached to the Channel Fleet, and was paid off at Devonport in 1908 and transferred to the Portsmouth Division of the Home Fleet. She was employed in connection with the Dardanelles operations during the war, and rendered useful service after the *Queen Elizabeth* brought her guns into action against Cape Helles.

After the Armistice she returned to Devonport, where she was subsequently placed on the sale list.—*Naval and Military Record*, 4 January, 1922.

A MINISTRY OF DEFENSE.—Unity of control in matters of national defence is not a novel idea. It has many times been mooted in this and other countries, and on at least two occasions has been put into practice abroad, with disastrous results. Although the German navy nominally remained an independent command throughout the war, it was actually controlled by the General Staff through the medium of the Kaiser as Supreme War Lord, and in the last resort its movements were directed by the military chiefs. In the same way the Russian navy was placed under military control at the outbreak of war, and its activities were always governed by the exigencies of the land campaign. This meant that the fleets in the Baltic and Black Sea were deprived of all initiative, and compelled to remain more or less passive on several occasions when a vigorous offensive would probably have changed the face of the whole war. But in spite of these discouraging examples a movement is now on foot here to group the navy, the army, and the air force under a Minister of Defence, and this, it is understood, being one of the leading proposals submitted by the Geddes Committee.

In our opinion the scheme is a bad one, however attractive it may seem to the lay mind. Of the many strong arguments which can be brought against it there is one that carries special weight—namely, the certainty that military influence would be supreme at the Ministry of Defence, and that soldiers would gradually come to dictate the principles of strategy by sea as well as on land. Such a system would sooner or later bring us to disaster. We have seen what has happened since the air force was annexed by the War Office. Service aviation has been developed mainly along army lines, and naval flying neglected. Representations to the Air Ministry have had no effect, for all the power there reposes in the hands of those who have a bias towards the land service. One of the crying needs of the moment is the setting up of an independent naval air service, but, instead of this, the country is now invited to reverse the traditional order of service seniority and place the navy under a department which would certainly be ruled by soldiers.—*Naval and Military Record*, 4 January, 1922.

JAPAN

WARSHIP CONSTRUCTION IN 1921.—The effect of the Washington reduction scheme will be to render null and void the capital ship programme which passed the Imperial Diet in July, 1920, authorising the construction of four battleships and four battle-cruisers. Furthermore, the scheme necessitates the cancelling of four large vessels which are approaching completion, viz., the battleships *Kaga* and *Tosa*, 40,000 tons

each, and the battle-cruisers *Amagi* and *Akagi*, of about 41,000 tons each, together with the battle-cruisers *Atago* and *Takao*. The keel of the *Atago* was laid at Kobe on November 25, but three weeks later it was announced that further work on the ship had been abandoned *sine die*. The *Takao* will not now be commenced. In all, therefore, Japan is called upon to forfeit fourteen capital ships, including nine which had not been laid down. After a great deal of negotiation at Washington it was decided that she should retain the battleship *Mutsu*, a sister of the *Nagato*, the necessary adjustments being made in the tonnage ratios assigned to the British Empire and the United States. A full descripion of all the Japanese vessels named above was published in *The Engineer* of November 25 last. The *Kaga*, one of the condemned battleships, was begun at the Kawasaki yard, Kobe, in July, 1920, and launched on November 17 of last year. Her sister ship, *Tosa*, was laid down at Nagasaki in February, 1920, but up to the present her launch has not been reported. Both vessels are to be broken up. The battle-cruisers *Amagi* and *Akagi*, also condemned, are very near the launching stage at the Government yards of Yokosuka and Kure respectively, and will doubtless be put afloat in order to clear the slips. The light cruiser *Nagara*, 5570 tons, was launched at Sasebo on April 25. She is very similar in all respects to the *Kuma* class, being designed for a speed of 33 knots and an armament of seven 5.5-in. guns. Sister ships are the *Isudzu* and *Natori*. All these later light cruisers are understood to be oil burners. Those completed have made very successful trials, achieving their designed speed without difficulty. Their fuel capacity, and consequently their steaming radius, is somewhat greater than that of British vessels of equivalent size. It is not known whether any of the twelve light cruisers authorised in 1920 have been commenced. About twenty destroyers, including several first-class boats of 1500 tons, are in varying stages of construction. The only intelligence as to submarine progress is derived from Press reports of doubtful authority. In October last the Osaka journal *Mainichi* wrote:—"The construction of submarines for the Japanese navy is being steadily carried out. Recently three submarines, one at Sasebo and two at Yokosuka, were launched, and there are now nine others under construction at the Kure, the Yokosuka, and the Sasebo naval arsenals, and the Kawasaki private yard. These are all medium-size boats, of 800 to 900 tons." Reports from other sources indicate that several submersible cruisers, of 2000 tons or more, are building in Japan. In an interview published last November, the Vice-Naval Minister, Admiral Ide, said that the Navy Department was then fully occupied in working out problems arising from the sudden cessation of work, involving heavy liabilities on the part of the Government and making provision for idle workmen, a problem with which neither Great Britain nor America was faced in the same degree. Considering her industrial position, Japan, he said, could not cease naval work suddenly without causing widespread distress among hundreds of thousands of people dependent on the workers. He added, however, that as soon as Washington had reached an agreement the work on order would be stopped both in private and State yards without regard to consequences. The Japanese papers state that, as all the yards in the country are now mainly dependent on naval contracts to keep them employed, the enforcement of the "naval holiday" may administer the death-blow to the ship-building industry.—*The Engineer*, 13 January, 1922.

LOSSES AND GAINS FROM FOUR-POWER PACT.—As regards the British Empire, the effect of the agreement is to bring our quota of sea power to a level with that of the United States, thus realising the policy which the Government, with the approval of the Admiralty, formally adopted nearly

two years ago. For some years we shall continue to have a slight margin in capital tonnage and a large one in cruising ships, though this will be negatived to some extent by the later design of the eight best U. S. battleships. In the Pacific Ocean the agreement will tend to place us at a disadvantage by inhibiting the creation of new bases which would be necessary for the maintenance of a great modern fleet. Japan ought not to be dissatisfied with the results of the Conference. Not only has it relieved her of the necessity of going forward with a building programme which imposed a dangerous strain on her pecuniary resources, but it has actually brought her a substantial increment in relative strength. It leaves her in unchallenged control of the Western Pacific and absolutely guarantees her policy in China against interference. She no longer has to fear the establishment of great American fleet bases within reach of her coasts.

These advantages are so important and obvious that it is surprising to learn that the Naval Agreement is violently criticised by a section of the Japanese people. At a meeting held in Tokyo on November 27, at which a number of prominent politicians, journalists, and professors were present, a resolution was passed deprecating the system of naval ratios and demanding a common standard of power for all navies. One speaker declared that Admiral Baron Kato, the principal Japanese delegate, ought never to be allowed to land at Yokohama if he failed in enforcing his seventy per cent proposal, while another urged that if this proposal was rejected every effort should be made to prevent the Privy Council from ratifying the arrangement which excluded it. A little reflection will no doubt convince these people that their chief delegate, so far from deserving opprobrium, merits the gratitude of his country for having guarded Japanese interests so successfully.—*Naval and Military Record*, 18 January, 1922.

REVIEW OF JAPANESE SHIPBUILDING.—As the year closes there are in operation in Japan fourteen shipbuilding yards capable of constructing ocean-going merchant ships, as compared with a total of fifty-three in 1918. Of these fourteen yards, only nine are actually engaged in the building of ocean-going tonnage, and in many cases progress on the vessels in hand has been slowed down almost to the vanishing point, in order to keep the organizations together as long as possible, or because the vessels themselves are not required on account of the general shipping depression. A considerable proportion of the new naval construction, however, has been given out to the private yards, largely to give employment to the workers; while some of these establishments have turned their attention to structural engineering, locomotive and tramcar building, or to the manufacture of motor cars, aeroplanes, etc.

Omitting small craft, the estimated output of merchant tonnage for the year under review is forty vessels of 190,000 gross tons. This compares with a pre-war output of from 30,000 to 40,000 gross tons from the four shipyards then capable of turning out vessels of over 1,000 tons. It

TABLE I.—MERCHANT SHIPS CONSTRUCTED

Year	No. of Ships	Gross Tons
1914	16	78,010
1915	8	40,485
1916	40	141,827
1917	89	348,430
1918	189	518,786
1919	136	621,513
1920	93	433,265
1921	40	190,000*

*Estimated.

will be seen, therefore, in spite of the relatively depressed conditions, that the tonnage constructed is about six times the normal pre-war output. Table 1 shows the rise and fall in the output of new mercantile shipping from 1914 to the end of 1921.—*The Shipbuilder,* January, 1922.

JAPANESE COMPETITION FELT.—Japanese competition in the Chinese coasting trade is extremely serious, and is likely to become more so unless the cost of operating British vessels can be reduced. Even taking into consideration the recent increase in Japanese wages, says the *Shipping World,* the salaries paid to man a Japanese vessel of, say, 2,000 tons is little more than half what it costs a British vessel of the same tonnage. For some time the Chinese boycott of Japanese vessels favored the employment of British tonnage on this coast, but now the boycott appears to have died a natural death, and the Chinese are prepared to employ the cheapest tonnage available.—*Nautical Gazette,* 16 January 1922.

UNITED STATES

THREATENED REDUCTION IN NAVY PERSONNEL.—That the House naval committee contemplates some action at this session looking to a reduction in the personnel strength of the navy, both commissioned and enlisted, was confirmed this week when Chairman Butler of that committee authorized the statement that a reduction would be recommended by his committee and inviting suggestions from service sources as to the best method of bringing about a scientific reduction and indicating that in the absence of such helpful suggestions the naval committee would proceed to bring about a reduction in personnel strength in its own way. This cut will apply to all branches of the naval service, including, of course, the regiment of midshipmen; but how the reduction will be brought about and how deeply the incision will be made can only be conjectured. This contemplated action of Mr. Butler's committee is readily recognized as being a much more businesslike move than the gesture of Senator King last week in introducing his joint resolution summarily calling for the immediate reduction of the army to 75,000 and the navy to 50,000, for it presages a change in the present general law which fixes the commissioned strength of the navy upon a percentage basis upon an authorized enlisted strength of 140,000 men. The appropriations committee of the House could further reduce the number of enlisted men allowed the navy for next fiscal year in the same simple manner it adopted in the last navy act by appropriating for a less number; but the authorized officer strength of the navy will remain as it is until the statute has been changed, and which change can be made, under the rules of the House, only at the instance of the House navy committee. It is interesting to note, however, as stated in this paper last week, that upon making the computations of the commissioned strength on January 1, after the redistribution and the reductions caused by the reversion of temporary officers, it was ascertained that there were 4,071 line officers remaining, or practically the legal allowance of four per cent based upon the present enlisted strength, whereas the legally authorized strength of the navy would permit of the retention of 5,499 commissioned line officers. Whether or not the chairman of the naval committee will be successful in eliciting from naval sources any suggestions that would aid in a downward revision of the navy personnel is at least doubtful; but his candor in announcing his intentions is commendable.—*Army and Navy Register,* 14 January, 1922.

NAVY DEPARTMENT, BUREAU OF CONSTRUCTION AND REPAIR,
WASHINGTON, D. C.

January 10, 1922

VESSELS UNDER CONSTRUCTION, UNITED STATES NAVY—Progess as of Dec. 31, 1921

Type Number and Name	Contractor	Percent of Completion[1]			
		Jan. 1, 1922 on Total Ship		Dec. 1, 1921 on Total Ship	
BATTLESHIPS (BB)					
45 *Colorado*	New York S. B. Cpn.	86.	84.9	84.9	83.8
47 *Washington*	New York S. B. Cpn.	69.8	63.6	69.8	63.6
48 *West Virginia*	Newport News S. B. & D. D. Co.	70.	65.4	65.7	59.3
49 *South Dakota*	New York Navy Yard	38.	31.1	36.5	29.5
50 *Indiana*	New York Navy Yard	34.3	26.8	33.9	26.3
51 *Montana*	Mare Island Nvy. Yd.	27.6	19.	27.6	19.
52 *North Carolina*	Norfolk Navy Yard	36.7	27.1	36.7	27.1
53 *Iowa*	Newport News S. B. & D. D. Co.	31.2	26.5	30.7	25.8
54 *Massachusetts*	Beth. S. B. Cpn. (Fore River)	11.	4.3	11.	4.3
BATTLE CRUISERS (CC)					
1 *Lexington*	Beth. S. B. Cpn. (Fore River)	31.1	21.4	28.8	19.3
2 *Constellation*	Newport News S. B. & D. D. Co.	20.	17.6	17.1	15.
3 *Saratoga*	New York S. B. Cpn.	32.4	25.4	31.	23.6
4 *Ranger*	Newport News S. B. & D. D. Co.	3.8	1.4	3.5	1.3
5 *Constitution*	Philadelphia Nvy. Yd.	12.8	7.8	12.3	7.3
6 *United States*	Philadelphia Nvy. Yd.	11.8	6.8	11.5	6.5
SCOUT CRUISERS [LIGHT CRUISERS (CL)]					
4 *Omaha*	Todd D. D. & Const. Cpn.	99.	93.	98.4	91.7
5 *Milwaukee*	Todd D. D. & Const. Cpn.	93.6	86.2	93.6	86.
6 *Cincinnati*	Todd D. D. & Const. Cpn.	87.6	81.2	87.4	81.
7 *Raleigh*	Beth. S. B. Cpn. (Fore River)	63.7	45.6	63.7	45.6
8 *Detroit*	Beth. S. B. Cpn. (Fore River)	76.9	61.6	74.4	58.1
9 *Richmond*	Wm. Cramp & Sons Co.	83.	77.	81.	73.
(a) 10 *Concord*	Wm. Cramp & Sons Co.	79.	71.	74.	65.
11 *Trenton*	Wm. Cramp & Sons Co.	55.	43.	53.	40.
12 *Marblehead*	Wm. Cramp & Sons Co.	47.	33.	47.	33.
13 *Memphis*	Wm. Cramp & Sons Co.	40.	26.	40.	26.
AUXILIARIES					
Repair Ship No. 1, *Medusa* (AR1)	Puget Sd. Navy Yd.	74.1	62.7	72.5	60.9
Dest. Tender No. 3, *Dobbin* (AD3)	Phila. Nvy. Yd.	66.9	66.6	66.6	66.3
Dest. Tender No. 4, *Whitney* (AD4)	Boston Nvy. Yd.	47.1	37.8	41.3	35.
Sub. Tender No. 3, *Holland* (AS3)	Puget Sd. Nvy. Yd.	21.5	5.5	21.5	5.5
Aircraft Tender *Wright*, (AZ1)	Tietjen & Lang	Del. 12/16/21		99.3	.....
PATROL VESSELS					
Gunboat No. 22, *Tulsa* (PG22)	Charleston Nvy. Yd.	71.3	57.5	71.2	56.6
DESTROYERS					
338 *Wasmuth*	Mare Island Nvy. Yd.	Comm. 12/16/21		99.9	99.9
339 *Trever*	Mare Island Nvy. Yd.	98.8	98.8	98.	98.
340 *Perry*	Mare Island Nvy. Yd.	86.	85.7	82.7	82.2
341 *Decatur*	Mare Island Nvy. Yd.	82.1	81.8	79.5	79.

(a) Light Cruiser No. 10 *Concord*—Launched 12/15/21

There are four fleet submarines and thirty-seven submarines under construction.

There are five fleet submarines and one submarine authorized but not under construction or contract.

CAPITAL SHIP STRENGTH AS DETERMINED BY THE ARMAMENTS CONFERENCE

Displacement—Efficiency in Last Column Estimated on 20-Year Life Assigned by Conference

CAPITAL SHIPS	Heavy Guns	Broadside Energy Foot-Tons	Date Completed	Displacement in Tons	Years Old, Nov. 11, 1921	Fraction of 20-Year Life Remaining	Displacement-Efficiency as Reduced by Age
UNITED STATES							
Maryland	Eight 16"	792,000	1921	32,600	0	20/20	32,600
Colorado	Eight 16"	792,000	1921	32,600	0	20/20	32,600
Washington	Eight 16"	792,000	1921	32,600	0	20/20	32,600
California	Twelve 14"	914,160	1921	32,300	0	20/20	32,300
Tennessee	Twelve 14"	914,160	1920	32,300	1	19/20	30,685
Idaho	Twelve 14"	914,160	1919	32,000	2	9/10	28,800
Mississippi	Twelve 14"	914,160	1917	32,000	4	4/5	25,600
New Mexico	Twelve 14"	914,160	1918	32,000	3	17/20	27,200
Arizona	Twelve 14"	787,272	1916	31,400	5	15/20	23,550
Pennsylvania	Twelve 14"	787,272	1916	31,400	5	15/20	23,550
Oklahoma	Ten 14"	656,060	1916	27,500	5	15/20	20,625
Nevada	Ten 14"	656,060	1916	27,500	5	15/20	20,625
Texas	Ten 14"	656,060	1914	27,000	7	13/20	17,550
New York	Ten 14"	656,060	1914	27,000	7	13/20	17,550
Arkansas	Twelve 12"	629,746	1912	26,000	9	11/20	14,300
Wyoming	Twelve 12"	629,746	1912	26,000	9	11/20	14,300
Utah	Ten 12"	490,000	1911	21,825	10	10/20	10,912
Florida	Ten 12"	490,000	1911	21,825	10	10/20	10,912
Totals	192	13,385,176		525,850			416,269
GREAT BRITAIN							
Hood (modified)	Eight 16"	817,280	.....	37,000	0	20/20	37,000
Hood (modified)	Eight 16"	817,280	.....	37,000	0	20/20	37,000
Royal Sovereign	Eight 15"	658,400	1916	26,600	5	15/20	19,950
Royal Oak	Eight 15"	658,400	1916	26,600	5	15/20	19,950
Resolution	Eight 15"	658,400	1916	26,600	5	15/20	19,950
Revenge	Eight 15"	658,400	1916	26,600	5	15/20	19,950
Ramilies	Eight 15"	658,400	1917	26,600	4	16/20	21,280
Queen Elizabeth	Eight 15"	658,400	1915	28,925	6	7/10	20,247
Warspite	Eight 15"	658,400	1915	28,925	6	7/10	20,247
Barham	Eight 15"	658,400	1915	28,925	6	7/10	20,247
Valiant	Eight 15"	658,400	1916	28,925	5	15/20	21,694
Malaya	Eight 15"	658,400	1916	28,925	5	15/20	21,694
Benbow	Ten 13.4"	606,000	1914	25,850	7	13/20	16,803
Empress of India	Ten 13.5"	606,000	1914	25,850	7	13/20	16,803
Iron Duke	Ten 13.5"	606,000	1914	25,850	7	13/20	16,803
Marlborough	Ten 13.5"	606,000	1914	25,850	7	13/20	16,803
Hood	Eight 15"	658,400	1920	43,000	1	19/20	40,850
Renown	Six 15"	493,800	1916	27,550	5	15/20	20,663
Repulse	Six 15"	493,800	1916	27,550	5	15/20	20,663
Tiger	Eight 13.5"	484,800	1914	29,600	7	13/20	19,289
Totals	164	12,773,360		582,725			447,357
JAPAN							
Nagato	Eight 16"	745,840	1921	35,000	0	20/20	35,000
Mutsu	Eight 16"	745,840	1921	35,000	0	20/20	35,000
Hiuga	Twelve 14"	789,600	1918	32,750	3	17/20	27,837
Ise	Twelve 14"	789,600	1917	32,750	4	16/20	26,200
Yamashiro	Twelve 14"	789,600	1917	32,000	4	16/20	25,600
Fuso	Twelve 14"	789,600	1915	32,000	6	7/10	22,400
Kirishima	Eight 14"	526,400	1915	28,450	6	7/10	19,915
Haruna	Eight 14"	526,400	1915	28,450	6	7/10	19,915
Hiyei	Eight 14"	526,400	1914	28,450	7	13/20	18,493
Kongo	Eight 14"	526,400	1913	28,450	8	6/10	17,070
Totals	96	6,755,680		313,300			247,430

—*Scientific American*, February, 1922.

CUTTING OUR NAVY RATIO.—"Men fight, not ships," said the late Admiral Lord Fisher, the greatest naval man of his day. If the reminder was needed in England, it is needed much more in the United States. The British have been compelled to think of their navy and to keep it efficient as a matter of vital importance to their safety. But Americans have given little thought for a generation to naval or marine affairs, convinced that war was a misfortune with which we need not seriously concern ourselves. Civilian fallacies as to defense therefore have much more influence in this country than in England, and one of these is that which Lord Fisher corrects in the maxim quoted. We have a disposition to think that we can invent mechanical devices to win wars. We assume that if we build a certain number of battleships we have a naval defense. We think ships fight. We do not stop to realize that ships do not fight, but, as the old naval phrase goes, "are fought." John Paul Jones' ship did not fight, Jones fought his ship. Perry, Decatur, Farragut, Dewey, fought their ships.

"Of course," says the American civilian when it is put that way, "of course I know a ship must be fought by men." But while he says this a congressman rises and proposes to cut our naval personnel so that our ships lack the men to fight them.

We have just entered into an agreement to hold our ships to a certain ratio. But Congressman Kelly of Michigan proposes such a reduction of naval personnel that this ratio is reduced from 5 to 2, measured by actual efficiency and the maxim that "men fight, not ships."

Congress should realize that the limitation of the British and Japanese navies make it certain that both these powers will see that their minimum is a highly efficient force. What is saved by the junking of old ships and the cessation of costly new building will be turned so far as is necessary to making their fleets 100 per cent efficient. If we, on the other hand, proceed to cut our naval personnel so that the ships we are permitted are undermanned and some of them laid up for lack of crews, we have altered the ratio of our naval power by our own act and to our own serious disadvantage. Our delegation has procured the acceptance of a ratio of strength represented by 5-5-3. But if our fleet is deprived of sufficient men our strength will no longer be represented by 5, but by some lesser figure. Captain Knox estimates that Congressman Kelley's proposed cut would reduce it to 2, or less than Japan.

This of course would be to overrule the well considered plan adopted by the Conference and defeat the attempt to secure our safety from attack. It is not economy to destroy our insurance.—*Chicago Tribune*, 20 December, 1921.

JUNKING ALL THE SHIPS.—The Navy Department announces that shortage of funds will prevent the projected joint maneuvers of the Atlantic and Pacific fleets which were to have been held in Panama Bay in February. There is not enough money for fuel. The fleet is divided in violation of correct navy principles, and it cannot be reunited, even for maneuvers, because it cannot buy enough coal and oil.

The attitude of Congress towards the navy is disquieting. The Administration agrees with Japan and Great Britain to junk part of it, but Congress wants to shoot the works and junk all of it, to decrease the personnel, make it impossible to man the ships and keep them in commission, and consequently make effective fighting of them impossible.

By such procedure Congress can reduce the American navy below the Japanese in spite of the higher ratio allowed by the Washington Conference. The limitation of tonnage means more than ever that the fighting power is in the men. Japan and Great Britain, having sound policies, will

know that competition has been eliminated from construction, but increased in training.

Both will take measures to increase the fighting power of the ship by increasing the skill of the officers and men. We shall be in luck if Congress does not insist upon the reverse of this and decrease the fighting power by depriving the navy of sufficient men and by making their proper training impossible because of lack of funds.

Then the United States, even with more ships, will have a fleet inferior to Japan's. That was Japan's relation to Russia and it cost Russia the war. Japan defeated the larger Russian navy because her ships had the better trained men and could fight better.—*Chicago Tribune*, 28 December, 1921.

THE PROPER MANNING OF OUR FLEET.—The so-called Hughes plan for the limitation of armaments provides in the case of the United States for the scrapping of ships not yet completed on which no officers and men are now serving. It also includes the junking of many of the older battleships which are now tied up, out of commission with no officers and men on board. In a similar manner and to a less extent, it applies to the other navies concerned.

It must be understood, therefore, that it does not actually reduce the numbers or strength of the ships of the active fleets now in commission belonging to the several nations party to the proposed agreement. New construction is to be stopped, and thereby money will be saved in the future. Old ships, out of commission, are to be sold, and thereby a present saving is to be accomplished.

It is becoming clear that the foreign navies, limited in new construction, intend to maintain their present active fleets at the highest possible point of efficiency with adequate and contented personnel. The Russo-Japanese war as well as the recent world war brought home one lesson very clearly, namely, that ships inadequately manned by poorly trained men are but a wasted effort. Today, as in former years, it is the quality of the personnel and not the ships themselves that decide victory or defeat for a nation.

The danger faces the United States that its people, misunderstanding the results of the Limitation of Armaments Conference, will lend themselves to the dismantling and crippling of their present active fleet which the agreements of the Conference authorize them to retain.

It must also be borne in mind that it takes time to commission a ship and get her up to the point of operating efficiently where she can take her place with success in the battle line. To mold and train the fleet into war harmony and team work takes long training and experience. To dissipate the efforts of the last few years in fleet development and war readiness is a matter of very serious moment to the country. It involves such a throwing away of costly effort in the training of officers and men and in material preparation, that a pause should be made to consider the consequences and the price to be paid before it is permitted.

There appears to be a tendency in Congress not only to accept what the Limitation of Armaments Conference proposes but to go much further and reduce the personnel that is required to properly man the ships which the conference plan authorizes the United States to retain. If this should be done it would mean that instead of a naval ratio of 5-5-3 being maintained between the United States, Great Britain, and Japan, the United States by its own act would lower its position in that ratio by cutting the strength of its present naval personnel—a personnel which already is not sufficient to man fully the fleet permitted to the United States, under the provisions of the Conference.

These facts should be brought home to the country for with them go sea power and the initiative in guiding world affairs. Unless a nation is strong and ready, her good intentions and ideals for the betterment of the world are of but small avail. With these facts are also bound up the questions of preparedness and national insurance against war.

THE MANNING OF OUR SHIPS.—The Limitation of Armaments Conference in its agreements permits the United States to retain a fleet greater than that now in active commission. The ships now in commission are short of officers and men; but in spite of this there are a number of gentlemen in Congress who propose to still further reduce the effectiveness of the fleet by heavy reductions in the personnel.

The country should be aroused to the danger of this, for with it accomplished our navy would fall well below the ratio of relative strength outlined in the provisions of the Limitations of Armaments Conference. Are we to hand over the sea power of the Pacific to another nation?

In comparing the personnel strength of the various navies, too frequently the error is made of examining the forces concerned on purely a numerical basis. The character and experience of the personnel should be studied before a true estimate of relative strengths can be attained.

In this connection, investigation will show that the navy of the United States is largely manned by young men in their first enlistment. In fact on June 30, 1921, there were approximately 98,000 men who were serving in the navy with no previous service, and with less than four (4) years' experience. When it is understood that on the same date the total strength of the navy was about 119,000 it is readily seen what a high percentage of new men were in the process of being trained for naval service.

On the same date there were approximately 8,000 men in the navy with four (4) and less than eight (8) years' service, and about 5,000 with eight (8) and less than twelve (12) years.

Examining the strength of the British navy for July, 1921, it is seen that out of a total strength of about 103,656 men, about 68,000 were serving in a continuous service period of twelve (12) years and 21,000 were in the ten (10) year enlistment period following the first twelve (12) year enlistment. But 8,000 were in the short service period of five (5) years.

The Japanese navy is organized very much on the same lines as the British. Both these services have reserves of seasoned officers and men in their merchant marine.

The United States navy with its short periods of enlistment and heavy yearly turnover in recruits and discharges is at a disadvantage in its effort to maintain the same relative plane of efficiency and war readiness.

During the fiscal year ending June 30, 1921, there were about 54,000 first enlistments and 16,000 reënlistments, while the discharges amounted to about 57,000, and the desertions to about 10,000.

It is clear from the above that in order for the United States to hold its fleets on the same relative numerical strength as say that of Great Britain, setting aside the question of the degree of experience, our navy should maintain a personnel approximately fifteen per cent greater in order to allow for the boys in training barracks and schools of instruction ashore.

This also brings home the fact that due to the high percentage of new men constantly in our service the need of experienced officers to train and supervise ship operations is of necessity higher in our navy than in the other two services that have been under consideration, where the men are more seasoned and of longer sea service.

Instead of this being the case it will be found upon investigation that but about 600 out of the total officer line strength of our navy on Janu-

ary 1, 1922, can, from length of service, be considered experienced officers; and that the ratios of officers to men in the British and Japanese navies is higher than in our own.

The above are some of the points that must be clearly understood in meeting the effort to reduce the strength of our present navy personnel.

JANUARY SHIPBUILDING OUTPUT IN DETAIL.—The Bureau of Navigation, Department of Commerce, reports 69 sailing, steam, gas and unrigged vessels of 46,108 gross tons built in the United States and officially numbered during the month of December, 1921, as follows:

	Atlantic and Gulf		Pacific		Great Lakes		Western Rivers		Total	
	No.	Gross	No.	Gross	No.	Gross	No.	Gross	No.	Gross
WOOD										
Sailing	8	133	..	.....	....	.....	....	.....	8	133
Steam	....	.....	2	226	1	39	....	.....	3	265
Gas	26	438	10	320	2	19	4	108	42	885
Unrigged	2	877	3	499	....	.....	1	11	6	1,387
Total	36	1,448	15	1,045	3	58	5	119	59	2,670
METAL										
Sailing	....	.....	..	.....	....	.....	....	.....	....	.....
Steam	9	43,247	..	.....	....	.....	1	191	10	43,438
Gas	....	.....	..	.....	....	.....	....	.....	....	.....
Unrigged	....	.....	..	.....	....	.....	....	.....	....	.....
Total	9	43,247	..	.....	....	.....	1	191	10	43,438
TOTALS										
Sailing	8	133	..	.....	....	.....	....	.....	8	133
Steam	9	43,247	2	226	1	39	1	191	13	43,703
Gas	26	438	10	320	2	19	4	108	42	885
Unrigged	2	877	3	499	....	.....	1	11	6	1,387
Grand total	45	44,695	15	1,045	3	58	6	310	69	46,108

The above total includes 26 rigged vessels of 529 gross tons and 4 unrigged vessels of 1,108 gross tons, total 30 vessels of 1,637 gross tons built in years previous to 1921. Of the above total, 1 vessel of 14,187 gross tons was built for the United States Shipping Board. This was the passsenger and cargo carrier *Lone Star State*. Other large vessels built during the month were the tankers *Byron D. Benson* and *New Jersey* of 8,211 and 6,740 gross tons respectively, the Munson Line steamer *Munargo* of 6,484 gross tons and the freighter *Steel Navigator* of 5,718 gross tons.

The following vessels which are not included in the above statement were built in this country for foreign owners during the month of December, 1921.

Rig.	Name of vessel	Gross	Owner	Flag
S.t.s.	*Clowrock* (now *Canonier*)	3,285	Lloyd Royal Belge	Belgian
S.t.s.	*Osiris* (now *Bombardier*)	3,285	Lloyd Royal Belge	Belgian
S.t.s.	*San Teodoro*	5,874	Eagle Oil Transport Co.	British

—*Nautical Gazette*, 16 January, 1922.

BIDS FOR RECONDITIONING THE LEVIATHAN.—Bids for reconditioning the *Leviathan* have been opened and the offer of the Newport News Shipbuilding and Dry Dock Company to complete the work on the machinery and hull for $6,110,000 was the lowest. John Wanamaker submitted a bid of $587,303 for furnishing the hotel equipment of the vessel.

The bidders and the amount of their bids were as follows:

	General Specifications	Mach'y.
New York Harbor and Dry Dock Co.	$10,130,400	$766,714
Standard Shipbuilding Corporation	10,192,675	923,772
Morse Dry Dock & Repair Co.	8,497,000	692,200
Tietjen & Lang Dry Dock Co.	7,357,924	532,656
Newport News Shipbuilding & Dry Dock Co.	5,595,000	515,000
Warwick Machine Works, Newport News, Va.	10,350,616	629,931
James Shewan & Sons	9,374,000	725,000

As a result of the unexpectedly low bids received by the Shipping Board, it is now probable that the giant ex-German liner will be refitted for service under the United States flag. The offer of the Newport News Shipbuilding and Dry Dock Company came as a gratifying surprise to the Board, their offer being fully $1,000,000 less than anticipations. Officials of the Board and Fleet Corporation state that the bids were satisfactory, and that the Board will now attempt to raise the funds. It may be necessary to ask Congress for a special appropriation.—*Nautical Gazette*, 7 January, 1922.

AGAMEMNON AND MOUNT VERNON MAY BE REPAIRED.—As to the suggestion made recently that the *Mount Vernon* and the *Agamemnon* should be repaired and placed in service under the United States lines with the *George Washington* and the *America*, Joseph W. Powell, president of the Emergency Fleet Corporation, states that it is the intention of the Shipping Board to recondition these ships for the North Atlantic service, provided Congress grants the request of the Shipping Board for certain appropriations.

The reconditioning of the *Agamemnon* and *Mount Vernon* would not require a very large outlay. The Board is still undecided as to whether it should refit any of the other ex-German liners.—*Nautical Gazette*, 22 January, 1922.

FIRST AMERICAN SHIP WITH DIESEL ELECTRIC METHOD HAS SEA TEST.—The official sea trials of the motorship *Fordonian*, the first ocean-going merchant ship in the United States to be equipped with the Diesel engine electric method of propulsion, were held successfully last week from the Teboe Yacht Basin of the Todd Shipyards Corporation. A large party of prominent marine engineers and shipping men witnessed the test, under which the ship's performance exceeded the most sanguine expectations.

During the trials she attained a speed of 10.12 knots, and in order to develop full propellor speed of 120 r.p.m. the motor developed 720 h.p. at the propeller shaft. With the ship fully loaded the motor will be called upon to deliver the full rated horse-power of 850 in order to turn the propeller at this speed.

The *Fordonian* represents the culmination of several years of development work in successfully adapting electric transmission to the oil engine for large ships. The electric apparatus is of the General Electric Company type, consisting of two 350 k.w. generators, each driven by a two-cycle four cylinder Ansaldo San Giorgio Diesel engine of 500 brake h.p. Motive power is supplied by a double armature 850 h.p. motor direct connected to the propeller and designed to furnish a speed of about nine to ten knots.

The control is from the engine room and has been devised to give the utmost flexibility of operation. The main control equipment consists of a panel on which are mounted the various switches, field rheostats and instruments; a master controller for operating the contactors of the control

group; the control group for starting and reversing the motor, and a starting resistor and motor field resistor for obtaining lower speed ranges. The normal operating propeller speed is 120 r.p.m. The control arrangement allows for the use of either or both generators supplying current to the propeller motor, depending upon the speed requirements.

The *Fordonian* is 250 feet long with a beam of 42 feet. Her registered tonnage is 2,568. She is owned by the American-Mediterranean Steamship Company, McDonnell & Truda, agents, and will be engaged in coastwise traffic between New York and Havana. She was formerly equipped with straight Diesel engine drive and was converted to electric operation by the Todd Shipyards Corporation, under the supervision of J. Marwitz, superintending engineer for the owners.

The only other commercial ship with a similar drive in this country today is the 200-ton fishing trawler, *Mariner*, equipped with General Electric apparatus and now operating out of Gloucester, Mass.—*Nautical Gazette*, 21 January, 1922.

TEXT OF TREATIES IN REGARD TO LIMITATION OF ARMAMENTS

TEXT OF FIVE-POWER NAVAL PACT AS APPROVED IN ARMS PARLEY

CHAPTER I

General Provisions Relating to the Limitation of Naval Armament

ARTICLE I

The contracting Powers agree to limit their respective naval armament as provided in the present treaty.

ARTICLE II

The contracting Powers may retain respectively the capital ships which are specified in Chapter II, Part 1. On the coming into force of the present treaty, but subject to the following provisions of this article, all other capital ships, built or building, of the United States, the British Empire and Japan shall be disposed of as prescribed in Chapter II, Part 2.

In addition to the capital ships specified in Chapter II, Part 1, the United States may complete and retain two ships of the *West Virginia* class now under construction. On the completion of these two ships the *North Dakota* and *Delaware* shall be disposed of as prescribed in Chapter II, Part 2.

The British Empire may, in accordance with the replacement table in Chapter II, Part 3, construct two new capital ships not exceeding 35,000 tons (35,560 metric tons) standard displacement each. On the completion of the said two ships the *Thunderer*, *King George V*, *Ajax* and *Centurion* shall be disposed of as prescribed in Chapter II, Part 2.

ARTICLE III

Subject to the provisions of Article II, the contracting Powers shall abandon their respective capital ship building programs, and no new capital ships shall be constructed or acquired by any of the contracting Powers except replacement tonnage which may be constructed or acquired as specified in Chapter II, Part 3.

Ships which are replaced in accordance with Chapter II, Part 3, shall be disposed of as prescribed in Part 2 of that chapter.

ARTICLE IV

The total capital ship replacement tonnage of each of the contracting Powers shall not exceed in standard displacement, for the United States

525,000 tons (533,400 metric tons); for the British Empire 525,000 tons (533,400 metric tons); for France 175,000 tons (177,800 metric tons); for Italy 175,000 tons (177,800 metric tons); for Japan 315,000 tons (320,040 metric tons).

ARTICLE V

No capital ship exceeding 35,000 tons (35,560 metric tons) standard displacement shall be acquired by, or constructed by, for, or within the jurisdiction of, any of the contracting Powers.

ARTICLE VI

No capital ship of any of the contracting Powers shall carry a gun with a caliber in excess of sixteen inches (406 millimeters).

ARTICLE VII

The total tonnage for aircraft carriers of each of the contracting Powers shall not exceed in standing displacement, for the United States 135,000 tons (137,160 metric tons); for the British Empire 135,000 tons (137,160 metric tons); for France 60,000 tons (60,960 metric tons); for Italy 60,000 tons (60,960 metric tons); for Japan 81,000 tons (82,296 metric tons).

ARTICLE VIII

The replacement of aircraft carriers shall be effected only as prescribed in Chapter II, Part 3, provided, however, that all aircraft carrier tonnage in existence or building on November 12, 1921, shall be considered experimental, and may be replaced, within the total tonnage limit prescribed in Article VII, without regard to its age.

ARTICLE IX

No aircaft carrier exceeding 27,000 tons (27,432 metrict tons) standard displacement shall be acquired by, or constructed by, for or within the jurisdiction of, any of the contracting Powers.

However, any of the contracting Powers may, provided that its total tonnage allowance of aircraft carriers is not thereby exceeded, build not more than two aircraft carriers, each of a tonnage of not more than 33,000 tons (33,528 metric tons) standard displacement, and in order to effect economy any of the contracting Powers may use for this purpose any two of their ships, whether contructed or in course of construction, which would otherwise be scrapped under the provisions of Article II. The armament of any aricraft carriers exceeding 27,000 tons (27,432 metric tons) standard displacement shall be in accordance with the requirements of Article X, except that the total number of guns to be carried in case any of such guns be of a caliber exceeding six inches (152 millimeters), except anti-aircraft guns and guns not exceeding five inches (126.7 millimeters), shall not exceed eight.

ARTICLE X

No aircraft carrier of any of the contracting Powers shall carry a gun with a caliber in excess of eight inches (203 millimeters). Without prejudice to the provision of Article IX, if the armament carried includes guns exceeding six inches (152 millimeters) in caliber the total number of guns carried, except anti-aircraft guns and guns not exceeding five inches (126.7 millimeters), shall not exceed ten. If alternatively the armament contains no guns exceeding six inches (152 millimeters) in caliber, the number of guns is not limited. In either case the number of anti-aircraft guns and of guns not exceeding five inches (126.7 millimeters) is not limited.

ARTICLE XI

No vessel of war exceeding 10,000 tons (10,160 metric tons) standard displacement, other than a capital ship or aircraft carrier, shall be acquired by, or constructed by, for, or within the jurisdiction of, any of the contracting Powers. Vessels not specifically built as fighting ships nor taken in time of peace under government control for fighting purposes which are employed on fleet duties or as troop transports or in some other way for the purpose of assisting in the prosecution of hostilities otherwise than as fighting ships, shall not be within the limitations of this article.

ARTICLE XII

No vessel of war or any of the contracting Powers, hereafter laid down, other than a capital ship, shall carry a gun with a caliber in excess of eight inches (203 millimeters).

ARTICLE XIII

Except as provided in Article IX, no ship designated in the present treaty to be scrapped may be reconverted into a vessel of war.

ARTICLE XIV

No preparations shall be made in merchant ships in time of peace for the installation of warlike armaments for the purpose of converting such ships into vessels of war, other than the necessary stiffening of decks for the mounting of guns not exceeding six-inch (152 millimeters) caliber.

ARTICLE XV

No vessel of war constructed within the jurisdiction of any of the contracting Powers for a non-contracting Power shall exceed the limitations as to displacement and armament prescribed by the present treaty for vessels of a similar type which may be constructed by or for any of the contracting Powers; provided, however, that the displacement for aircraft carriers constructed for a non-contracting Power shall in no case exceed 27,000 tons (27,432 metric tons) standard displacement.

ARTICLE XVI

If the construction of any vessel of war for a non-contracting Power is undertaken within the jurisdiction of any of the contracting Powers, such Power shall promptly inform the other contracting Powers of the date of the signing of the contract and the date on which the keel of the ship is laid; and shall also communicate to them the particulars relating to the ship prescribed in Chapter II, Part 3, Section I (b), (4) and (5).

ARTICLE XVII

In the event of a contracting Power being engaged in war, such Power shall not use as a vessel of war any vessel of war which may be under construction within its jurisdiction for any other Power, or which may have been constructed within its jurisdiction for another Power and not delivered.

ARTICLE XVIII

Each of the contracting Powers undertakes not to dispose by gift, sale or any mode of transfer of any vessel of war in such a manner that such vessel may become a vessel of war in the navy of any foreign Power.

ARTICLE XIX

The United States, the British Empire and Japan agree that the *status quo* at the time of the signing of the present treaty, with regard to fortifications and naval bases, shall be maintained in their respective territories and possessions specified hereunder:

(1) The insular possessions which the United States now holds or may hereafter acquire in the Pacific Ocean, except (a) those adjacent to the coast of the United States, Alaska and the Panama Canal Zone, not including the Aleutian Islands, and (b) the Hawaiian Islands.

(2) Hongkong and the insular possessions which the British Empire now holds or may hereafter acquire in the Pacific Ocean, east of the meridian of 110 degrees east longitude, except (a) those adjacent to the coast of Canada, (b) the Commonwealth of Australia and its territories, and (c) New Zealand.

(3) The following insular territories and possessions of Japan in the Pacific Ocean, to wit: the Kurile Islands, the Bonin Islands, Amami-Oshima, the Loochoo Islands, Formosa and the Pescadores, and any insular territories or possessions in the Pacific Ocean which Japan may hereafter acquire.

The maintenance of the *status quo* under the foregoing provisions implies that no new fortifications or naval bases shall be established in the territories and possessions specified; that no measures shall be taken to increase the existing naval facilities for the repair and maintenance of naval forces, and that no increase shall be made in the coast defense of the territories and possessions above specified. This restriction, however, does not preclude such repair and replacement of worn-out weapons and equipment as is customary in naval and military establishments in time of peace.

ARTICLE XX

The rules for determining tonnage displacements prescribed in Chapter II, Part 4, shall apply to the ships of each of the Contracting Powers.

CHAPTER II

Rules Relating to the Execution of the Treaty—Definition of Terms

PART 1

Capital ships which may be retained by the contracting Powers.—In accordance with Article II ships may be retained by each of the Contracting Powers as specified in this Part.

SHIPS WHICH MAY BE RETAINED BY THE UNITED STATES

Name	Tonnage
Maryland	32,600
California	32,300
Tennessee	32,300
Idaho	32,300
New Mexico	32,000
Mississippi	32,000
Arizona	31,400
Pennsylvania	31,400
Oklahoma	27,500
Nevada	27,500
New York	27,500
Texas	27,000
Arkansas	26,000
Wyoming	26,000
Florida	21,825
Utah	21,825
North Dakota	20,000
Delaware	20,000
Total tonnage	500,650

On the completion of the two ships of the *West Virginia* class and the scrapping of the *North Dakota* and *Delaware*, as provided in Article II, the total tonnage to be retained by the United States will be 525,850 tons.

SHIPS WHICH MAY BE RETAINED BY THE BRITISH EMPIRE

Name	Tonnage
Royal Sovereign	25,750
Royal Oak	25,750
Revenge	25,750
Resolution	25,750
Ramillies	25,750
Malaya	27,500
Valiant	27,500
Barham	27,500
Queen Elizabeth	27,500
Warspite	27,500
Benbow	25,000
Emperor of India	25,000
Iron Duke	25,000
Marlborough	25,000
Hood	41,200
Renown	26,500
Repulse	26,500
Tiger	28,500
Thunderer	22,500
King George V	23,000
Ajax	23,000
Centurion	23,000
Total tonnage	580,450

On the completion of the two new ships to be constructed and the scrapping of the *Thunderer, King George V, Ajax* and *Centurion*, as provided in Article II, the total tonnage to be retained by the British Empire will be 558,950 tons.

SHIPS WHICH MAY BE RETAINED BY FRANCE

Name	Tonnage (metric tons)
Bretagne	23,500
Lorraine	23,500
Provence	23,500
Paris	23,500
France	23,500
Jean Bart	23,500
Courbet	23,500
Condorcet	18,890
Diderot	18,890
Voltaire	18,890
Total tonnage	221,170

France may lay down new tonnage in the years 1927, 1929, and 1931, as provided in Part 3, Section II.

SHIPS WHICH MAY BE RETAINED BY ITALY

Name	Tonnage (metric tons)
Andrea Doria	22,700
Caio Duilio	22,700
Conte Di Cavour	22,500
Giulio Cesare	22,500
Leonardo da Vinci	22,500
Dante Alighieri	19,500
Roma	12,600
Napoli	12,600
Vittorio Emanuele	12,600
Regina Elena	12,600
Total tonnage	182,800

Italy may lay down new tonnage in the years 1927, 1929, and 1931, as provided in Part 3, Section II.

SHIPS WHICH MAY BE RETAINED BY JAPAN

Name	Tonnage
Mutsu	33,800
Nagato	33,800
Hiuga	31,260
Ise	31,260
Yamashiro	30,600
Fuso	30,600
Kirishima	27,500
Haruna	27,500
Hiyei	27,500
Kongo	27,500
Total tonnage	301,320

PART 2

Rules for scrapping vessels of war—The following rules shall be observed for the scrapping of vessels of war which are to be disposed of in accordance with Articles II and III.

I. A vessel to be scrapped must be placed in such condition that it cannot be put to combatant use.

II. This result must be finally effected in any one of the following ways:

(a) Permament sinking of the vessel;

(b) Breaking the vessel up. This shall always involve the destruction or removal of all machinery, boilers and armor, and all deck, side and bottom plating;

(c) Converting the vessel to target use exclusively. In such case all the provisions of paragraph III of this part, except sub-paragraph (6), in so far as may be necessary to enable the ship to be used as a mobile target (7), must be previously complied with. Not more than one capital ship may be retained for this purpose at one time by any of the contracting Powers.

(d) Of the capital ships which would otherwise be scrapped under the present treaty in or after the year 1931, France and Italy may each retain two sea-going vessels for training purposes exclusively, that is, as gunnery or torpedo schools. The two vessels retained by France shall be of the *Jean Bart* class, and of those retained by Italy one shall be the *Dante Alighieri*, the other of the *Guilio Cesare* class. On retaining these ships for the purpose above stated, France and Italy respectively undertake to remove and destroy their conning-towers, and not to use the said ships as vessels of war.

III. (a) Subject to the special exceptions contained in Article IX, when a vessel is due for scrapping, the first stage of scrapping, which consists in rendering a ship incapable of further warlike service, shall be immediately undertaken.

(b) A vessel shall be considered incapable of further warlike service when there shall have been removed and landed, or else destroyed in the ship:

(1) All guns and essential portions of guns, fire-control tops and revolving parts of all barbettes and turrets;

(2) All machinery for working hydraulic or electric mountings;

(3) All fire-control instruments and range-finders;

(4) All ammunition, explosives and mines;

(5) All torpedos, war-heads and torpedo-tubes;

(6) All wireless telegraphy installations;

(7) The conning tower and all side armor, or alternatively all main propelling machinery; and

(8) All landing and flying-off platforms and all other aviation accessories.

IV. The periods in which scrapping of vessels is to be effected are as follows:

(a) In the case of vessels to be scrapped under the first paragraph of Article II, the work of rendering the vessels incapable of further warlike service in accordance with paragraph III of this part, shall be completed within six months from the coming into force of the present treaty, and the scrapping shall be finally effected within eighteen months from such coming into force.

(b) In the case of vessels to be scrapped under the second and third paragraphs of Article II, or under Article III, the work of rendering the vessel incapable of further warlike service in accordance with paragraph III of this part shall be commenced not later than the date of completion of its successor, and shall be finished within six months from the date of such completion. The vessel shall be finally scrapped, in accordance with paragraph II of this part, within eighteen months from the date of completion of its successor. If, however, the completion of the new vessel be delayed, then the work of rendering the old vessel incapable of further warlike service in accordance with paragraph III of this part shall be commenced within four years from the laying of the keel of the new vessel, and shall be finished within six months from the date on which such work was commenced, and the old vessel shall be finally scrapped in accordance with paragraph II of this part within eighteen months from the date when the work of rendering it incapable of further warlike service was commenced.

PART 3

Replacement.—The replacement of capital ships and aircraft carriers shall take place according to the rules in Section I and the tables in Section II of this part.

SECTION I.—Rules for replacement—(a) Capital ships and aircraft carriers twenty years after the date of their completion may, except as otherwise provided in Article VIII and in the tables in Section II of this Part, be replaced by new construction, but within the limits prescribed in Article IV and Article VII. The keels of such new construction may, except as otherwise provided in Article VIII and in the tables in Section II of this Part, be laid down not earlier than seventeen years from the date of completion of the tonnage to be replaced, provided, however, that no capital ship tonnage, with the exception of the ships referred to in the third paragraph of Article II, and the replacement tonnage specifically mentioned in Section II of this Part, shall be laid down ten years from November 12, 1921.

(b) Each of the contracting Powers shall communicate promptly to each of the other contracting Powers the following information:

(1) The names of the capital ships and aircraft carriers to be replaced by new construction;

(2) The date of governmental authorization of replacement tonnage;

(3) The date of laying the keels of replacement tonnage;

(4) The standard displacement in tons and metric tons of each new ship to be laid down, and the principal dimensions, namely, length at waterline, extreme beam at or below waterline, mean draft at standard displacement;

(5) The date of completion of each new ship and its standard displacement in tons and metric tons, and the principal dimensions, namely, length at waterline, extreme beam at or below waterline, mean draft at standard displacement, at time of completion.

(c) In case of loss or accidental destruction of capital ships or aircraft carriers, they may immediately be replaced by new construction subject to the tonnage limits prescribed in Articles IV and VII and in conformity with the other provisions of the present treaty, the regular replacement program being deemed to be advanced to that extent.

(d) No retained capital ships or aircraft carriers shall be reconstructed except for the purpose of providing means of defense against air and submarine attack, and subject to the following rules: The contracting Powers may, for that purpose, equip existing tonnage with bulge or blister or anti-air attack deck protection, providing the increase of displacement thus effected does not exceed 3,000 tons (3,048 metric tons) displacement for each ship. No alterations in side armor, in caliber, number or general type of mounting of main armament shall be permitted except:

(1) In the case of France and Italy, which countries within the limits allowed for bulge may increase their armor protection and the caliber of the guns now carried on their existing capital ships so as not to exceed sixteen inches (406 millimeters) and

(2) the British Empire shall be permitted to complete, in the case of the *Renown*, the alterations to armor that have already been commenced but temporarily suspended.

SECTION II

REPLACEMENT AND SCRAPPING OF CAPITAL SHIPS UNITED STATES

Year	Ships laid down	Ships completed	Ships scrapped (age in parentheses)	Ships retained Pre-Jutland	Ships retained Post-Jutland
			Maine (20), *Missouri* (20), *Virginia* (17), *Nebraska* (17), *Georgia* (17), *New Jersey* (17), *Rhode Island* (17), *Connecticut* (17), *Louisiana* (17), *Vermont* (16), *Kansas* (16), *Minnesota* (16), *New Hampshire* (15), *South Carolina* (13), *Michigan* (13), *Washington* (0), *South Dakota* (0), *Indiana* (0), *Montana* (0), *North Carolina* (0), *Iowa* (0), *Massachusetts* (0), *Lexington* (0), *Constitution* (0), *Constellation* (0), *Saratoga* (0), *Ranger* (0), *United States* (0).*	17	1
1922	A, B‡		*Delaware* (12), *North Dakota* (12)	15	3
1923				15	3
1924				15	3
1925				15	3
1926				15	3
1927				15	3
1928				15	3
1929				15	3
1930				15	3
1931	C, D			15	3
1932	E, F			15	3
1933	G			15	3
1934	H, I	C, D	*Florida* (23), *Utah* (23), *Wyoming* (22)	12	5
1935	J	E, F	*Arkansas* (23), *Texas* (21), *New York* (21)	9	7
1936	K, L	G	*Nevada* (20), *Oklahoma* (20)	7	8
1937	M	H, I	*Arizona* (21), *Pennsylvania* (21)	5	10
1938	N, O	J	*Mississippi* (21)	4	11
1939	P, Q	K, L	*New Mexico* (21), *Idaho* (20)	2	13
1940		M	*Tennessee* (20)	1	14
1941		N, O	*California* (20), *Maryland* (20)	0	15
1942		P, Q	2 ships *West Virginia* class	0	15

*The United States may retain the *Oregon* and *Illinois*, for noncombatant purposes, after complying with the provisions of Part 2, III, (b).

‡Two *West Virginia* class.

Note—A, B, C, D, etc., represent individual capital ships of 35,000 tons standard displacement, laid down and completed in the years specified.

REPLACEMENT AND SCRAPPING OF CAPITAL SHIPS BRITISH EMPIRE

Year	Ships laid down	Ships completed	Ships scrapped (age in parentheses)	Ships retained Summary. Pre-Jutland	Post-Jutland
			Commonwealth (16), *Agamemnon* (13), *Dreadnought* (15), *Bellerophon* (12), *St. Vincent* (11), *Inflexible* (13), *Superb* (12), *Neptune* (10), *Hercules* (10), *Indomitable* (13), *Temeraire* (12), *New Zealand* (9), *Lion* (9), *Princess Royal* (9), *Conqueror* (9), *Monarch* (9), *Orion* (9), *Australia* (9), *Agincourt* (7), *Erin* (7), 4 building or projected.*	21	1
1922	A, B‡			21	1
1923				21	1
1924				21	1
1925		A, B	*King George V* (13), *Ajax* (12), *Centurion* (12), *Thunderer* (13)	17	3
1926				17	3
1927				17	3
1928				17	3
1929				17	3
1930				17	3
1931	C, D			17	3
1932	E, F			17	3
1933	G			17	3
1934	H, I	C, D	*Iron Duke* (20), *Marlborough* (20), *Emperor of India* (20), *Benbow* (20)	13	5
1935	J	E, F	*Tiger* (21), *Queen Elizabeth* (20), *Warspite* (20), *Barham* (20)	9	7
1936	K, L	G	*Malaya* (20), *Royal Sovereign* (20)	7	8
1937	M	H, I	*Revenge* (21), *Resolution* (21)	5	10
1938	N, O	J	*Royal Oak* (22)	4	11
1939	P, Q	K, L	*Valiant* (23), *Repulse* (23)	2	13
1940		M	*Renown* (24)	1	14
1941		N, O	*Ramillies* (24), *Hood* (21)	0	15
1942		P, Q	*A* (17), *B* (17)	0	15

*The British Empire may retain the *Colossus* and *Collingwood* for noncombatant purposes, after complying with the provisions of Part 2, III (b).

‡Two 35,000-ton ships, standard displacement.

NOTE—A, B, C, D, etc., represent individual capital ships of 35,000 tons standard displacement laid down and completed in the years specified.

REPLACEMENT AND SCRAPPING OF CAPITAL SHIPS FRANCE

Year	Ships laid down	Ships completed	Ships scrapped (age in parentheses)	Ships retained Summary. Pre-Jutland	Post-Jutland
1922				7	0
1923				7	0
1924				7	0
1925				7	0
1926				7	0
1927	35,000 tons			7	0
1928				7	0
1929	35,000 tons			7	0
1930		35,000 tons	*Jean Bart* (17), *Courbet* (17)	5	(*)
1931	35,000 tons			5	(*)
1932	35,000 tons	35,000 tons	*France* (18)	4	(*)
1933	35,000 tons			4	(*)
1934		35,000 tons	*Paris* (20), *Bretagne* (20)	2	(*)
1935		35,000 tons	*Provence* (20)	1	(*)
1936		35,000 tons	*Lorraine* (20)	0	(*)
1937				0	(*)
1938				0	(*)
1939				0	(*)
1940				0	(*)
1941				0	(*)
1942				0	(*)

*Within tonnage limitations; number not fixed.

NOTE—France expressly reserves the right of employing the capital ship tonnage allotment as she may consider advisable, subject solely to the limitations that the displacement of individual ships should not surpass 35,000 tons, and that the total capital ship tonnage should keep within the limits imposed by the present Treaty.

REPLACEMENT AND SCRAPPING OF CAPITAL SHIPS ITALY

Year	Ships laid down	Ships completed	Ships scrapped (age in parentheses)	Ships retained Summary Pre-Jutland	Post-Jutland
1922				6	0
1923				6	0
1924				6	0
1925				6	0
1926				6	0
1927	35,000 tons			6	0
1928				6	0
1929	35,000 tons			6	0
1930				6	0
1931	35,000 tons	35,000 tons	*Dante Alighiere* (19)	5	(*)
1932	45,000 tons			5	(*)
1933	25,000 tons	35,000 tons	*Leonardo da Vinci* (19)	4	(*)
1934				4	(*)
1935		35,000 tons	*Guilio Cesare* (21)	3	(*)
1936		45,000 tons	*Conte di Cavour* (21), *Duilio* (21)	1	(*)
1937		25,000 tons	*Andrea Doria* (21)	0	(*)

*Within tonnage limitations; number not fixed.

NOTE—Italy expressly reserves the right of employing the capital ship tonnage allotment as she may consider advisable, subject solely to the limitations that the displacement of individual ships should not surpass 35,000 tons, and the total capital ship tonnage should keep within the limits imposed by the present treaty.

REPLACEMENT AND SCRAPPING OF CAPITAL SHIPS JAPAN

Year	Ships laid down	Ships completed	Ships scrapped (age in parentheses)	Ships retained Summary Pre-Jutland	Post-Jutland
			Hizen (20), *Mikasa* (20), *Kashima* (16), *Katori* (16), *Satsuma* (12), *Aki* (11), *Settsu* (10), *Ikoma* (14), *Ibuki* (12), *Kurama* (11), *Amagi* (0), *Akagi* (0), *Kaga* (0), *Tosa* (0), *Takao* (0), *Atago* (0). Projected program 8 ships not laid down.*	8	2
1922				8	2
1923				8	2
1924				8	2
1925				8	2
1926				8	2
1927				8	2
1928				8	2
1929				8	2
1930				8	2
1931				8	2
1931	A			8	2
1932	B			8	2
1933	C			8	2
1934	D	A	*Kongo* (21)	7	3
1935	E	B	*Hiyei* (21), *Haruna* (20)	5	4
1936	F	C	*Kirishima* (21)	4	5
1937	G	D	*Fuso* (22)	3	6
1938	H	E	*Yamashiro* (21)	2	7
1939	I	F	*Ise* (22)	1	8
1940		G	*Hiuga* (22)	0	9
1941		H	*Nagato* (21)	0	9
1942		I	*Mutsu* (21)	0	9

*Japan may retain the *Shikishima* and *Asahi* for noncombatant purposes, after complying with the provisions of Part 2, III, (b).

NOTE—A, B, C, D, etc., represent individual capital ships of 35,000 tons standard displacement laid down and completed in the years specified.

NOTE APPLICABLE TO ALL TABLES IN SECTION II

The order above prescribed in which ships are to be scrapped is in accordance with their age. It is understood that when replacement begins according to the above tables the order of scrapping in the case of the ships of each of the contracting Powers may be varied at its option; provided, however, that such Power shall scrap in each year the number of ships above stated.

PART 4

Definitions

For the purposes of the present treaty, the following expressions are to be understood in the sense defined in this part.

Capital Ship—A capital ship, in the case of ships hereafter built, is defined as a vessel of war, not an aircraft carrier, whose displacement exceeds 10,000 tons (10,160 metric tons) standard displacement. or which carries a gun with a calibre exceeding eight inches (203 millimeters).

Aircraft Carrier—An aircraft carrier is defined as a vessel of war with a displacement in excess of 10,000 tons (10,160 metric tons) standard displacement designed for the specific and exclusive purpose of carrying aircraft. It must be so constructed that aircraft can be launched therefrom and landed thereon, and not designed and constructed for carrying a more powerful armament than that allowed to it under Article IX or Article X as the case may be.

Standard Displacement—The standard displacement of a ship is the displacement of the ship complete, fully manned, engined, and equipped ready for sea, including all armament and ammunition, equipment, outfit, provisions and fresh water for crew, miscellaneous stores and implements of every description that are intended to be carried in war, but without fuel or reserve feed water on board.

The word "ton" in the present treaty, except in the expression "metric tons," shall be understood to mean the ton of 2240 pounds (1016 kilo).

Vessels now completed shall retain their present ratings of displacement tonnage in accordance with their national system of measurement. However, a Power expressing displacement in metric tons shall be considered for the application of the present Treaty as owning only the equivalent displacement in tons of 2240 pounds.

A vessel completed hereafter shall be rated at its displacement tonnage when in the standard condition defined herein.

CHAPTER III

Miscellaneous Provisions

ARTICLE XXI

If during the term of the present treaty the requirements of the national security of any contracting Power in respect of naval defense are, in the opinion of that Power, materially affected by any change of circumstances, the contracting Powers will, at the request of such Power, meet in conference with a view to the reconsideration of the provisions of the treaty and its amendment by mutual agreement.

In view of possible technical and scientific developments, the United States, after consultation with the other contracting Powers, shall arrange for a conference of all the contracting Powers, which shall convene as soon as possible after the expiration of eight years from the coming into force of the present treaty to consider what changes, if any, in the treaty may be necessary to meet such developments.

ARTICLE XXII

Whenever any contracting Power shall become engaged in a war which in its opinion affects the naval defense of its national security, such Power may, after notice to the other contracting Powers suspend for the period of hostilities its obligations under the present treaty other than those under Articles XIII and XVII, provided that such Power shall notify the other contracting Powers that the emergency is of such a character as to require such suspension.

The remaining contracting Powers shall in such case consult together with a view to agreement as to what temporary modifications, if any, should be made in the treaty as between themselves. Should such consultation not produce agreement, duly made in accordance with the constitutional methods of the respective Powers, any one of said contracting Powers may, by giving notice to the other contracting Powers, suspend for the period of hostilities its obligations under the present treaty, other than those under Articles XIII and XVII.

On the cessation of hostilities the contracting Powers will meet in conference to consider what modifications, if any, should be made in the provisions of the present treaty.

ARTICLE XXIII

The present treaty shall remain in force until December 31, 1936, and in case none of the contracting Powers shall have given notice two years before that date of its intention to terminate the treaty, it shall continue in force until the expiration of two years from the date on which notice of termination shall be given by one of the contracting Powers, whereupon the treaty shall terminate as regards all the contracting Powers. Such notice shall be communicated in writing to the Government of the United States, which shall immediately transmit a certified copy of the notification to the other Powers and inform them of the date on which it was received. The notice shall be deemed to have been given and shall take effect on that date. In the event of notice of termination being given by the Government of the United States, such notice shall be given to the diplomatic representatives at Washington of the other contracting Powers, and the notice shall be deemed to have been given and shall take effect on the date of the communication made to the said diplomatic representatives.

Within one year of the date on which a notice of termination by any Power has taken effect, all the contracting Powers shall meet in conference.

ARTICLE XXIV

The present treaty shall be ratified by the contracting Powers in accordance with their respective constitutional methods and shall take effect on the date of the deposit of all the ratifications, which shall take place at Washington as soon as possible. The Government of the United States will transmit to the other contracting Powers a certified copy of the proces-verbal of the deposit of ratifications.

The present treaty, of which the English and French texts are both authentic, shall remain deposited in the archives of the Government of the United States, and duly certified copies thereof shall be transmitted by that Government to the other contracting Powers.

In faith where of the above-named plenipotentiaries have signed the present treaty.

Done at the City of Washington the . . . . . day of . . . . One thousand nine hundred and twenty-two.

TEXT OF FIVE-POWER TREATY CURBING SUBMARINE AND CHEMICAL WARFARE

The United States of America, the British Empire, France, Italy and Japan, hereinafter referred to as the signatory Powers, desiring to make more effective the rules adopted by civilized nations for the protection of the lives of neutrals and noncombatants at sea in time of war, and to prevent the use in war of noxious gases and chemicals, have determined to conclude a treaty to this effect and have appointed as their plenipotentiaries:

The President of the United States of America:

Charles Evans Hughes,
Henry Cabot Lodge,
Oscar W. Underwood,
Elihu Root, citizens of the United States;

His Majesty the King of the United Kingdom of Great Britain and Ireland and of the British Dominions Beyond the Seas, Emperor of India:

The Right Honourable, Arthur James Balfour, O. M., M. P., Lord President of His Privy Council;

The Right Honourable Baron Lee of Fareham, G. B. E., K. C. B., First Lord of His Admiralty;

The Right Honourable Sir Auckland Campbell Geddes, K. C. B., His Ambassador Extraordinary and Plenipotentiary to the United States of America;

And,

For the Dominion of Canada:

The Right Honourable Sir Robert Laird Borden, M. C. M. G. K. C.;

For the Commonwealth of Australia:

Senator the Right Honourable George Foster Pearce, Minister for Home and Territories;

For the Dominion of New Zealand:

The Honourable Sir John William Salmond, K. C., Judge of the Supreme Court of New Zealand;

For the Union of South Africa:

The Right Honourable Arthur James Balfour, O. M., M. P.;

For India:

The Right Honourable Valingman Sankaranarayana Srinivasa Sastri, member of the Indian Council of State;

The President of the French Republic:

Mr. Albert Sarraut, Deputy Minister of the Colonies;

Mr. Jules J. Jusserand, Ambassador Extraordinary and Plenipotentiary to the United States of America, Grand Cross of the National Order of Legion of Honour;

His Majesty the King of Italy:

The Honourable Carlo Schanzer, Senator of the Kingdom;

The Honourable Vittorio Rolandi Ricci, Senator of the Kingdom, His Ambassador Extraordinary and Plenipotentiary at Washington;

The Honourable Luigi Albertini, Senator of the Kingdom;

His Majesty the Emperor of Japan:

Baron Tomosaburo Kato, Minister for the Navy, Junii, a member of the First Class of the Imperial Order of the Grand Cordon of the Rising Sun with the Paulownia Flower;

Baron Kijuro Shidehara, His Ambassador Extraordinary and Plenipotentiary at Washington, Joshii, a member of the First Class of the Imperial Order of the Rising Sun;

Mr. Masanao Hanihara, Vice Minister for Foreign Affairs, Jushii, a member of the Second Class of the Imperial Order of the Rising Sun;

Who, having communicated their Full Powers, found in good and due form have agreed as follows:

Section 1. The signatory Powers declare that, among the rules adopted by civilized nations for the protection of the lives of neutrals and non-combatants at sea in time of war, the following are to be deemed an established part of international law:

(1) A merchant vessel must be ordered to submit to visit and search to determine its character before it can be seized.

A merchant vessel must not be attacked unless it refuse to submit to visit and search after warning, or to proceed as directed after seizure.

A merchant vessel must not be destroyed unless the crew and passengers have been first placed in safety.

(2) Belligerent submarines are not under any circumstances exempt from the universal rules above stated, and if a submarine cannot capture a merchant vessel in conformity with these rules, the existing law of nations requires it to desist from attack and from seizure and to permit the merchant vessel to proceed unmolested.

Other Powers Asked to Assent

Section II. The signatory Powers invite all other civilized Powers to express their assent to the foregoing statement of established law, so that there may be a clear public understanding throughout the world of the standards of conduct by which the public opinion of the world is to pass judgment upon future belligerents.

Section III. The signatory Powers, desiring to insure the enforcement of the humane rules of existing law declared by them with respect to attacks upon and the seizure and destruction of merchant ships, further declare that any person in service of any Power who shall violate any of those rules, whether or not such person is under orders of a governmental superior, shall be deemed to have violated the laws of war and shall be liable to trial and punishment as if for an act of piracy, and may be brought to trial before the civil or military authorities of any Power within the jurisdiction of which he may be found.

Section IV.—The signatory Powers recognize the practical impossibility of using submarines as commerce destroyers without violating, as they were violated in the war of 1914-1918, the requirements universally accepted by civilized nations for the protection of the lives of neutrals and noncombatants; and to the end that the prohibitoin of the use of submarines as commerce destroyers shall be universally accepted as a part of the law of nations, they now accept that prohibition as henceforth binding as between themselves, and they invite all other nations to adhere thereto.

Poison Gas Prohibited

Section V—The use in war of asphyxiating, poisonous or other gases, and all analogous liquids, materials or devices, having justly been condemned by the public opinion of the civilized world and a prohibition of such use having been declared in treaties to which a majority of the civilized Powers are parties, the signatory Powers, to the end that this prohibition shall be universally accepted as a part of international law, binding alike the conscience and practice of nations, declare their assent to such prohibition, agree to be bound thereby as between themselves and invite all other civilized nations to adhere thereto.

Section VI—The present treaty shall be ratified as soon as possible in accordance with the constitutional methods of the signatory Powers, and shall take effect on the deposit of all the ratifications, which shall take place at Washington.

The Government of the United States of America will transmit to all the signatory Powers a certified copy of the process-verbal of the deposit of ratifications.

The present treaty, in French and in English, shall remain deposited in the archives of the Government of the United States of America, and duly certified copies thereof will be transmitted by that Government to each of the signatory Powers.

Section VII—The Government of the United States of America will further transmit to each of the non-signatory Powers a duly certified copy of the present treaty and invite its adherence thereto.

Any non-signatory Power may adhere to the present treaty by communicating an instrument of adherence to the Government of the United States of America, which will thereupon transmit to each of the signatory and adhering Powers a certified copy of each instrument of adherence.

In faith whereof, the above-named plenipotentiaries have signed the present treaty.—*Public Ledger Bureau*, Washington, 1 February.

HOW POWERS WILL STAND IN SEAPOWER BY NEW PACT.—A summary of the naval limitation treaty adopted by the five big naval Powers today, gives the following figures:

	Number of capital ships retained	Their total tonnage	Replacements not to cause tonnage excess	Tonnage of aircraft carriers
U. S.	18	500,650	525,000	135,000
Britain	22	580,450	525,000	135,000
France	9	221,171	175,000	60,000
Italy	10	182,800	175,000	60,000
Japan	9	301,320	315,000	81,000

—*Public Ledger Bureau*, Washington, 1 February.

AERONAUTICS

FRENCH GUIDE CABLE FOR FOG.—Admiral Fournier has communicated to the Academie des Sciences an account of successful tests of apparatus for the guidance of planes to their aerodromes by night or in fog carried out at Villacoublay by Lieutenant Loth of the French navy.

After more than a year's work Lieutenant Loth, who worked out a system of guiding ships into port in the thickest fog by wireless a couple of years ago, has devised a similar apparatus for planes which adds less than 10 lb. to the weight of the machine. On ground there is a guiding cable with an alternating current of 600 vibrations per second. In the machine there are three receiving devices. One of them records a deep and loud musical sound—which the pilot hears with the aid of ear-pieces fixed in his helmet—so long as the machine is flying parallel with the cable. The sound diminishes when the direction of the machine makes an angle with the cable and ceases altogether when the direction is at right angles to the cable. The second spiral records its loudest sound when the machine is flying at right angles to the cable and ceases to record when the plane is going parallel. The sound recorded by the third spiral varies according to the distance of the machine from the cable, but it stops dead the moment the machine crosses the cable. The sound can be caught as high up as 10,000 ft. and for a mile and a half on either side of the cable.

The first experiments failed because the sounds were drowned by the noise of the motors, but ear-pieces fixed in the helmets have overcome this difficulty.—*Aviation*, 30 January, 1922.

NAVAL AVIATION OFFICERS TO GERMANY.—The first detachment of naval aviation officers ordered to Germany to supervise and inspect the construction of the *L-71* type rigid airship authorized by the Allied Council has left the United States.

Lt. Comdr. Zachary Lansdowne, U. S. N., who has been in charge of the Lighter-than-Air Branch of the Bureau of Naval Aeronautics was

detached from that service on January 16 and detailed as assistant naval attaché at Berlin, Germany, where his duties will also include the supervision of the German commercial airship soon to be undertaken at Friederichshafen, Germany. Commander Lansdowne, an expert on lighter-than-air craft, made the trans-Atlantic trip on the British airship *R-34* in July 1919, being the only American on the trip over.

Lt. Comdr. G. Fulton, of the construction department of Naval Aviation, has been ordered to proceed to Germany to organize a bureau of aeronautical inspection.

It is understood that Lieut. R. G. Pennoyer, a survivor of the American *ZR-2* detachment Howden, may also be detailed to inspection duty in connection with the building of the Navy's great rigid airship.—*Aviation*, 30 January, 1922.

VARIABLE PITCH PROPELLER DEMONSTRATION.—There has been on demonstration at the works of The American Propeller & Mfg. Co., Baltimore, Md. a propeller designed by Spencer Heath and now in operation on a 4,000-pound land machine under full load and power conditions. The blades of this propeller can be adjusted universally in their sockets for any angle of forward or reverse pitch while the engine is running, the power of the engine itself being used to effect the changes of pitch. A light pull or pressure on a button is all that is required to produce any change of pitch desired. When the engine is at rest the pitch may be altered or reversed by turning a small hand crank located conveniently to the operator. At all times and during all changes of pitch the exact position of the blades is graphically shown by an indicator on the instrument board.

The speed of the engine is automatically controlled by the indicator mechanism so as to give the correct throttle position for every possible blade position and thus prevent racing or stalling the engine by manipulation of the pitch. The engine is subject at all times, however, to manual control of the throttle which may at any time interrupt and supervene upon the automatic throttle control. The entire operating mechanism is entirely disengaged and the blades securely locked at all times except during change or adjustment of the pitch.

Mr. Heath has worked on this invention for a couple of years and is most enthusiastic about it in connection with airships.

In discussing his invention Mr. Heath said:

"The average airship of the Zeppelin type is at the mercy of the wind and runs an enormous risk every time a landing is necessary. The crew has to maneuver the huge boats so that the rudders can be brought into play and act as brakes. With my variable or universal pitch propeller the dirigible can make its own wind and can reverse or go ahead as easily as a steamship entering her dock."—*Aviation*, 23 January, 1922.

WORLD'S ENDURANCE RECORD ESTABLISHED.—Flying continuously for 26 hours, 19 minutes and 35 seconds in gales, snow and a zero temperature, Edward Stinson and Lloyd Bertaud in a Larsen all-metal monoplane at Roosevelt Field, near Mineola, L. I., set a new world's record December 30, for sustained flight in a heavier-than-air machine. Averaging 85 miles an hour in circling above the flying field and surrounding country, the monoplane traveled at least 2,200 miles, or, translated into land distance, the equivalent of the Pacific gap between California and Hawaii.

Had the plane flown straightaway the pilots would have landed in Reno, Nev. The feat was all the more remarkable when it is compared with the previous endurance record of 24 hours, 19 minutes and 2 seconds made in France by Lucien Boussoutroy and Jean Bernard. Their flight

was made on a clear day in June of last year after careful preparation. Stinson and Bertaud agreed to make the attempt for J. L. Larsen, designer of the plane, the day before the start of the flight.

Numb with cold and exhausted by lack of sleep, Stinson and Bertaud brought the monoplane down to earth at 11:17:50 o'clock A. M., December 30. They both maintained that they would have remained up several hours longer had they not been forced to descend by reason of a faulty oil connection with which they had been struggling since three o'clock in the morning.—*Aerial Age Weekly*, 9 January, 1922.

COLOURED LIGHTS TO GUIDE PILOTS BY NIGHT.—The progress made by British civil aviation is emphasized in the half-yearly report issued by the Air Ministry on Friday.

Arrangements are being completed for opening the Croydon-Lympne air route for night flying, the machines to be guided by a chain of aerial lighthouses, pilotage and coloured lights.

The number of passengers carried was 31,853. Imports by air totalled £206,357, and exports £110,400.

Wireless apparatus will be made compulsory for all machines carrying ten or more passengers, with a view to minimizing risks from fogs, etc., states the report, which concludes by predicting a chain of inter-Imperial air communication lines.—*Naval and Military Record*, 28 December, 1921.

FOKKER ACHIEVEMENT.—According to London newspapers, Fokker, the famous Dutch aeroplane designer, who gave his name to the German fighting aeroplanes, has now invented and built a motorless aeroplane which can be towed behind an air express and "slipped" when over an intermediate air station. A pilot sits in the "aerial trailer," and after it is "slipped" by the engined air express, will guide it down to land. Thus it will be possible, it is said, for an air express on a journey from London to Brussels to drop passengers at Ostend without landing there, as a railway express train drops "slip coaches."—*Aerial Age Weekly*, 30 January, 1922.

AMERICAN FIRM ORDERS OCEAN-FLIGHT PLANE.—An American firm has just ordered an aeroplane of the type described by Louis Breuget, a famous French flier and constructor, as "an ocean-crossing plane." M. Breuget recently predicted that these aeroplanes will be making frequent trips across the Atlantic within two or three years. They are now under construction.

They are expected to be able to fly twenty-four hours without stopping at a speed of 180 miles an hour, and to carry twenty or thirty passengers with baggage. This would bring the two continents within a day's travel of each other.

The planes are being planned with huge wings, six feet thick, the interior of which will be used for cabins. As described by M. Breuget, their total weight will be 155 tons, their wing-spread 375 feet, and they will have twenty-four motors of 500 horsepower each.

"There is no reason why an aeroplane could not make the circuit of the world without a stop, if we pursued the formula as to weight-lifting and speed and if greater room can be found for fuel, say seventy per cent. of the total lifting power," says M. Breuget. "Such a plane would travel at a speed of 750 miles an hour, but this speed would be impossible unless an average height of 42,000 feet could be maintained. At such a height the atmosphere has one-fifth of its ordinary density.

"The vista spread out by such a possibility is amazing. Man could fly around the earth faster than the earth's movement. He could, so to

speak, catch up with the sun. New York would only be six hours from Europe. Again, in the case of war, what would be the use of big fleets if they were faced with huge 100 and 200 ton aerial torpedo planes? The navies of the world will then be relics of the past, fit only for a place in a museum next, let us say, to mammoths.

"People laugh at these predictions," ended M. Breuget, "but so did people in 1840 when steam navigation was introduced."—*Aerial Age Weekly*, 16 January, 1922.

MARTIN BOMBER MAKES RECORD.—Equipped with superchargers and with Lieutenant Willard S. Wade as pilot, the latest Martin bomber type of ship on December 7 climbed to an altitude of 21,000 feet, carrying four passengers but no bomb load. Due to a lack of oxygen the observer was overcome.

On December 8 the Martin bomber, equipped with superchargers and with Lieutenant Wade as pilot, climbed to an altitude of 25,600 feet until the gasoline supply was exhausted. In switching the gasoline tank to the emergency, it was found that the latter was frozen so it was necessary to discontinue the climb. The personnel, however, suffered no ill effects as there was a sufficient supply of oxygen. It is estimated that the ship can go to approximately 28,000 feet.

The authorities at McCook Field, Dayton, Ohio, from which these tests have been conducted, believe that the results which have been obtained are of the greatest importance in connection with the future of bombing airplanes. The record made on December 7, it is believed, is a world's altitude record for two-motored airplanes.—*Army and Navy Journal*, 24 December 1921.

BRITISH AIR MINISTRY TO OFFER £50,000 FOR A PRACTICAL HELICOPTER AEROPLANE.—Subject to Treasury sanction, the British Air Ministry proposes to offer a prize of £50,000 for a practical helicopter-designed aeroplane; that is, an aeroplane capable of rising vertically over a given spot.

Following are among the conditions to be observed by the competing designers: The machines must be capable of rising to a height of 2,000 feet under their own power, carrying one man and one hour's fuel supply; able to remain stationary over a ground object for half an hour in any wind up to twenty miles an hour; able to land safely in any wind up to twenty miles an hour without horizontal motion and with the engine cut off; able to maintain a horizontal flight at a height of 2,000 feet at a speed of not less than sixty miles an hour.

Foreign as well as British inventors will be invited to take part in the competition.

Some months ago, it is stated, experiments with the helicopter were to take place at Farnborough with a British inventor's machine. Great secrecy was observed by the Air Ministry in regard to the tests.

According to reports received in London last April, a successful flight with a helicopter had been made abroad. This machine was invented by Lieutenant von Petroczy of the Austrian Army Balloon Corps.—*Aerial Age Weekly*, 9 January, 1922.

SINGLE VS. MULTIPLE ENGINES.—It is commonly thought that safety and reliability are necessarily increased by increasing the number of engines. As a matter of fact the multiple engine plane has its disadvantages as well as its advantages, both of which may be quite definitely figured. For example, comparing a typical two-engine airplane with two single-engine ones, other things being equal, the former has the following advantages:

(1) It has half the liability to complete engine failure of either of the two single engine planes (neglecting fuel connections, etc., that may be common to both).
(2) It is slightly cheaper than the two small planes.
(3) It will carry slightly more, up to a certain size.
(4) For short trips the operating personnel would be cut down.

But, at the same time, the two-engine airplane has the following disadvantages:

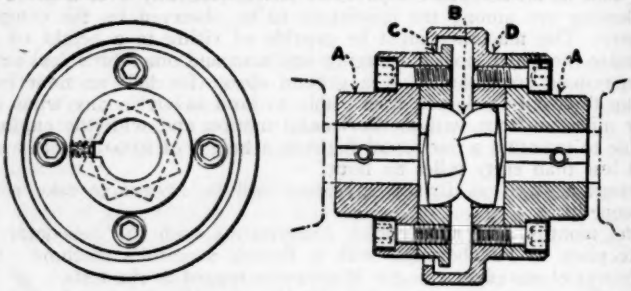
(1) It is twice as liable to engine trouble as either of the small planes.
(2) The danger arising from engine stoppage near the ground is probably greater due to the unbalanced thrust of the remaining propeller.
(3) The large plane must bear the expense of a full load even when the actual load carried is less than half.
(4) The difficulty of making an emergency landing is fully 50 per cent greater than for one of the small planes.

After all is said, the inherent advantages favoring any particular number of engines make but a small balance in either direction. This leaves as the main factor for consideration the fundamental one of choosing a design best fitted for the requirements of the particular service in view.—*Aviation*, 2 January, 1922.

ENGINEERING

WHITNEY FREE-FLOATING COUPLING.—With the general design of flexible couplings it is necessary, in the instance of motor or turbine-driven pumps or generators, practically to disassemble both units in order to remove one or the other from its casing. This is not necessary with the Whitney free-floating coupling, as because of its design the coupling element can be removed from the coupling without disturbing either the driving or the driven unit.

This coupling, which is made by the Kay Manufacturing Co., Norwalk, Conn., consists of two hubs *A*, a link *B*, an inner ring *C* and an outer



END AND SECTIONAL VIEW OF COUPLING

ring *D*. Both the inner and outer rings are secured to the two hubs by capscrews, the heads of which are in countersunk holes in the hubs. Clearance between the inner and outer rings permits the coupling to adjust itself to any misalignment of the shafts.

After the capscrews have been removed the rings *C* and *D*, together with the link *B*, can be taken out without disturbing the hubs *A* and *B*, after which either the driving or driven element can be removed from its casing, or the unit as a whole can be taken from its base without disturbing the other unit.—*Power*, 31 January, 1922.

A HIGH-SPEED CRANKLESS STEAM ENGINE.—Mr. A. G. M. Mitchell, the inventor of the "Michell-block," which has had a world-wide success, and has revolutionized practice in high-pressure bearings, has recently completed tests of a new type of steam engine. There have been many attempts to construct a crankless reciprocating steam engine, but none of these has achieved any great measure of success. In the latest type, however, advantage has been taken of the new principles upon which the Michell thrust-block is founded, with every appearance of practical success.

The engine is enclosed in a cylindrical casing, and the rotating shaft is co-axial with this casing. The cylinders are in two sets of four, arranged round the shaft with their axes parallel to it. Instead of crank-shafts there is a swash-plate, i.e., a plate with its plane inclined to the shaft-axis; the angle of inclination of the swash-plate in the test engine is 62½ degrees, but in later engines this will be increased to 67½ degrees. As the shaft rotates it will be seen that the surface of the swash-plate will alternately approach and recede from each of the cylinders in turn. Pistons in the cylinders, bearing upon the plate through spherical bearings and Michell pads, are thereby given a reciprocating motion. Opposing pistons are connected rigidly by a bar crossing the outside of the swash-plate. The engine is uniflow, steam acting on one side of the pistons only. It is admitted to the cylinders by two rotating disk valves, one at each end of the casing, and exhausts at the end of the stroke. Very perfect balance is assured, and the designed speed of 1200 r.p.m. is largely exceeded. The cylinders are 5 inches in diameter, and the engine develops about 90 horsepower at 1200 revolutions. It may be mentioned that the coefficient of friction at the Michell pads, where the pistons bear on the swash-plate, is about 0.002. The whole engine owes its success to this very low value. It may be that an engine of this general design may ultimately be used for aircraft power plant, because of low weight.—*Scientific American*, February, 1922.

RE-TURNING A RUDDER PINTLE IN DRY DOCK.—The task of turning up a rudder pintle which has become worn as a result of long service generally involves the removal of the rudder and taking it to a well-equipped repair shop.

That it is not impossible to do the job in dry dock is shown by the accompanying drawing, which illustrates a very ingenious but simple machine whereby a pintle which had worn approximately .200ths out of truth was returned; the only source of power required was an ordinary pneumatic drill provided with a reversing motion.

The rudder was lifted and placed in the bottom of the dry dock, the temporary cutting machine being arranged below the pintle center as shown in the diagram. A shaft provided with an adjustable center and carrying at the bottom a worm wheel is mounted between the center of the pintle and the body of the rudder. This shaft is driven by a worm which fits into the driving head of the pneumatic machine in the same way as the ordinary Morse taper drill. Secured to the shaft is the turning head which, while rotating with the shaft, is free to slide up or down on a feather key. The feed mechanism consists of an ordinary nut bolted on the turning head in which is a screw, the bottom of the screw being secured to a bracket on the shaft mounted just above the worm wheel.

The feed of the tool is obtained by means of a star-wheel as shown. Since, however, there is only room to give a very small travel of the turning head, this is provided with four grooves to take the cutting tool, the distance between each groove being slightly less than the maximum travel of the turning head.

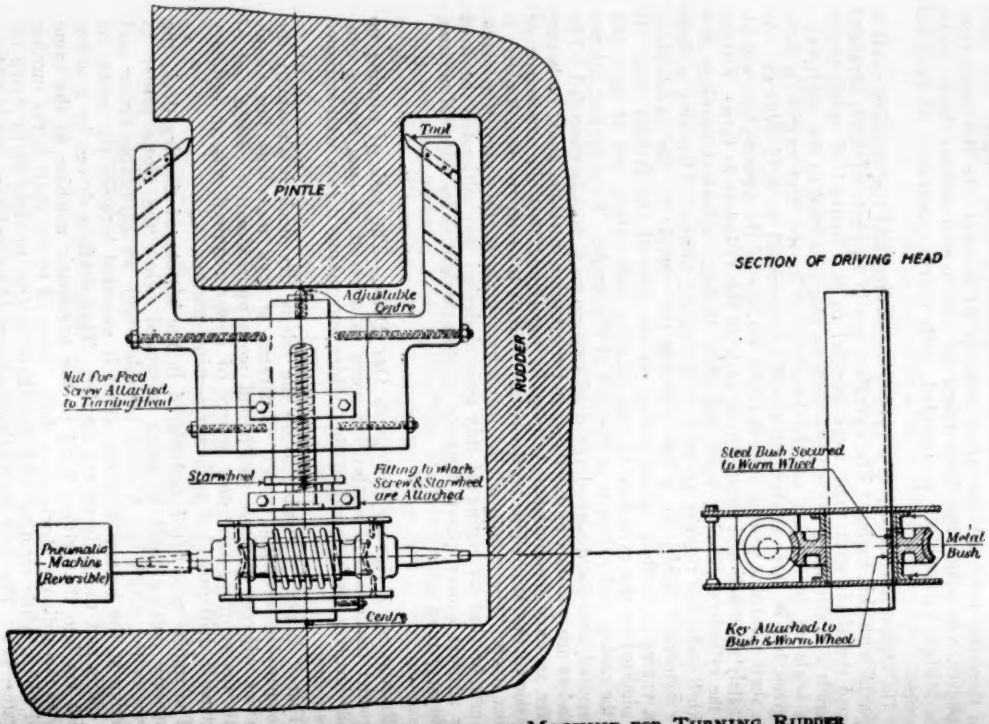


DIAGRAM SHOWING ARRANGEMENT OF MACHINE FOR TURNING RUDDER PINTLE IN DRY DOCK

As soon as the cut has been taken with the tool in, say, the lowest groove, the turning head is brought back to its lowest position and the tool inserted in the next groove. The process is then repeated until a cut is taken for the entire length of the pintle.

It was found that the apparatus worked very well, making a very true and smooth job.—*The Marine Engineer and Naval Architect,* January, 1922.

NAVIGATION AND RADIO

RADIO SHIP CONTROL, by Rear Admiral R. S. Griffin, U. S. N. Retired. —The bombing tests which were carried out last summer against the old battleship *Iowa* (now designated Coast Battleship No. 4), during which that ship was operated and maneuvered under her own power without the presence on board of any of her officers or crew, created so much public interest that it has been suggested that a description of the mechanical changes that were made in her power equipment would be of interest to the members of The American Society of Mechanical Engineers.

The *Iowa* is a ship 360 ft. long on the waterline, of 72.2 ft. beam, and at a draft of water of 24 ft. has a displacement of 11,346 tons. She has twin-screw vertical triple-expansion engines of 11,800 indicated horsepower which are capable of giving her a speed of 17-knots. They are, of course, condensing.

The problem presented was so to modify her power plant that the ship would be susceptible of control by radio energy from another ship, both as to speed and direction, without any person being on board; that under this condition she should be capable of steaming for at least two hours at a speed of about 10 knots; and that means should be provided for automatically stopping the engines and shutting off the oil supply to the boilers after fifteen minutes of operation following a failure of the radio control.

The first part of the problem obviously pointed to an oil equipment as the only one that could be considered, and as the *Iowa* was a coal-burning ship it became necessary to transform some of her boilers to oil-burning. The speed requirement of 10 knots necessitated the development of but a small fraction of full power, and therefore it was necessary to convert only one-half her boilers for steaming at a very moderate rate of combustion.

The boilers are of the Scotch or return fire-tube type, and therefore are not so well adapted to oil burning as are water-tube boilers. However, for the power that had to be developed, this presented no difficulty. The lining with firebrick of the combustion chambers and the front end of the furnaces, and the protection of the joint of furnace and combustion-chamber sheet were the only alterations that were necessary to the fire side of the boilers. Alterations to the furnace fronts were, of course, necessary to accommodate the oil burners. All these alterations are indicated in Fig. 1.

Fuel-oil pumps were installed and were equipped with stop valves in their steam lines such that these valves could be instantly closed by radio signal if it were desired to stop the engines, or automatically in case of low water in the boilers.

In order to maintain a uniform water level, it was necessary to install feedwater regulators, which controlled the speed of the feed pumps in the usual manner.

The storage of fuel necessary to provide the continuous steaming laid down in the problem was easily effected by utilizing a few of the double-bottom compartments.

The only alterations that were necessary to the engines were certain modifications of the throttles to permit of radio control. The type of engines made it necessary to design for the condition in which the engines

DIAGRAM SHOWING ARRANGEMENT OF MACHINE FOR TURNING RUDDER PINTLE IN DRY DOCK

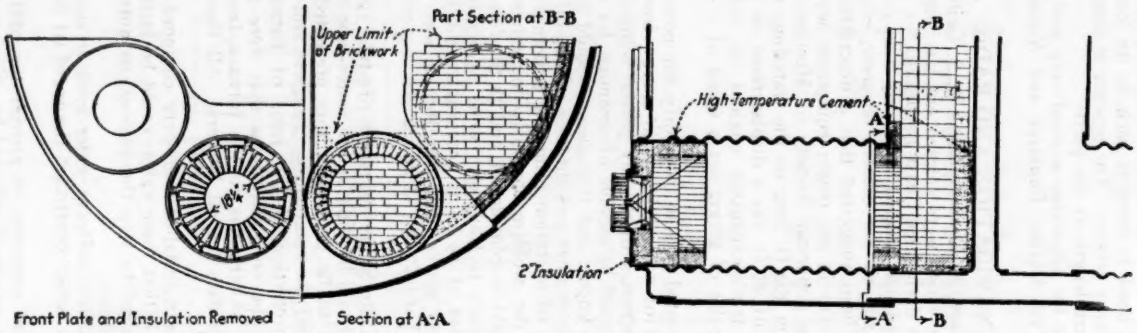


FIG. 1—ALTERATIONS IN SCOTCH MARINE BOILER TO ADAPT IT TO OIL BURNING

would be just turning over before the crew abandoned the ship, the function of the radio control then being to open the throttle to the extent necessary to secure the desired speed—which had been determined by test—and also to stop the engines should it be necessary so to do. The control was so effective that no difficulty whatever was experienced in controlling the speed, slowing down being accomplished in twenty seconds and increase to full speed in three minutes.

Such auxiliaries as air pumps, circulating pumps and bilge pumps, the operation of which at normal speed would have no material influence on either the speed of the engines or the boiler conditons, were unaffected by the conditions of the problem and were untouched after once having been set at the proper speed of operation.

The points that have thus far been mentioned pertain solely to the propulsion of the ship. In order to maneuver her, which was one of the most important considerations in connection with the bombing tests, it was necessary that the steam steering engine be under as complete radio control as the main engines. Ordinarily this is accomplished through wire-rope transmission from the steering wheel on the bridge to the shaft which operates the engine-control valve. For this test a small motor was installed and connected by chain drive to the control-valve shaft. It was provided with an automatic reversing contactor controller which was operated through the radio-control panel or automatically though the gyro clutch. It proved to be an admirable substitute for the hand steering wheel.

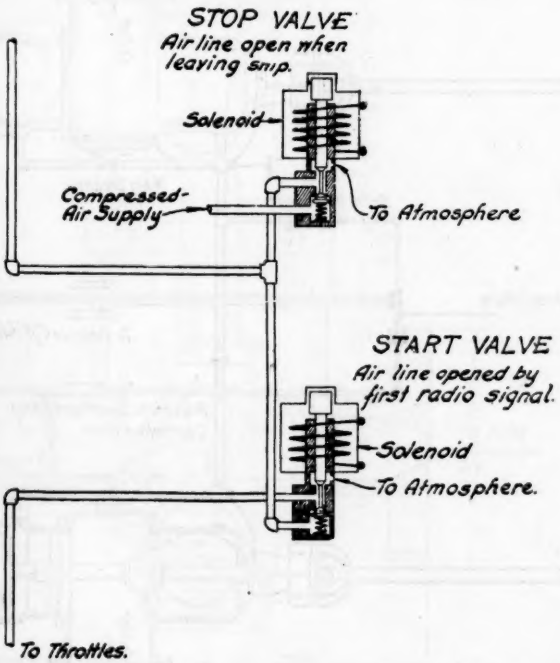


FIG. 2—RADIO-CONTROL VALVES FOR OPENING AND CLOSING THROTTLE-CONTROL VALVE, FIG. 3

Naturally, considerable electric energy would be necessary to operate the various radio circuits and apparatus, but as operation of the ship's electric plant during the test would unnecessarily complicate the problem without supplying any useful information respecting the results which it was desired to accomplish, it was decided to provide storage batteries and control panels for the several circuits.

In preparation for radio control the oil-fuel pumps, the air and circulating pumps, the feed pumps, an air compressor and a bilge pump are put in operation, and the steering engine warmed up and operated by hand control. When normal conditons are established, the main engines are started and kept running at dead-slow speed, the bridge control of steering engine thrown out, all batteries connected to bus bars, and switches to radio-control instruments and gyro compass, and steering-engine motor thrown in. Everything is now in readiness for radio contol and the signal given to "abandon ship." As soon as the boats that take off the crew are clear of the ship, she is immediately put under radio control by the control ship, which in this case was the battleship *Ohio,* which during the past two years has rendered excellent service in radio experimental work under the Bureau of Engineering of the Navy Department.

The method of control will be understood from the following:

When the air compressor is started, pressure is brought up to the "stop valve," Fig. 2, which may be called the master radio-control valve. This

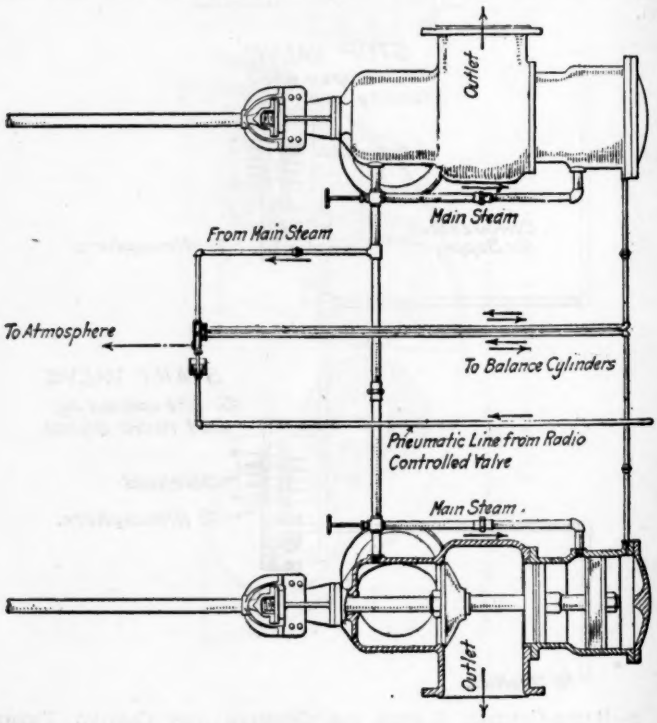


FIG. 3—DIAGRAMMATIC ARRANGEMENT OF QUICK-CLOSING MAIN ENGINE THROTTLE VALVES AND CONTROL VALVES

valve is then energized from the ship's control room, by which action air is admitted to the balance cylinder of a quick-closing valve in the steam line to the fuel-oil pump and up to the "start valve," as indicated in the sketch. The first signal from the control ship energizes the "start valve," Fig. 2, which admits air to the piston of the throttle-control valve shown in Fig. 3. This throws the piston to the left, shuts off steam from the upper balance pistons, and the throttles open to the extent necessary for the desired speed, the lower balance piston being smaller in diameter than the upper one.

The opening by the control ship of the radio circuit to "start valve" closes the valve to air pressure under the action of the spring, and the pressure in the line to throttle-control valve is released. When this occurs, the piston valve is thrown far enough to the right to uncover the port to the steam pipes leading to the upper chambers of the balance cylinders and the throttles close under the action of the steam pressure.

Similar action takes place when it is desired to stop the fuel-oil pump. The proper opening of the steam valve to this pump having been pre-

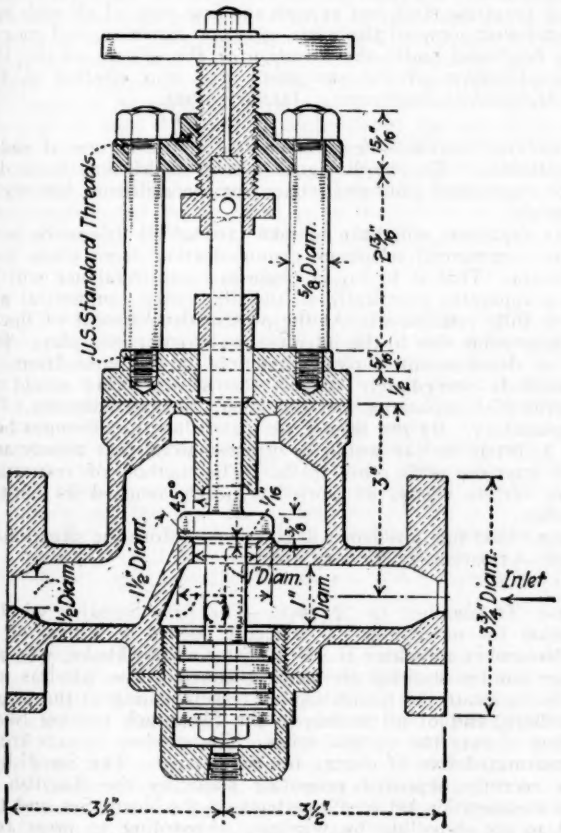


FIG. 4

viously determined and air pressure being on its balance piston, a radio signal releases the air pressure, whereupon the valve closes automatically under the influence of steam pressure on the other side of the balance piston. The throttles close at the same time. Fig. 4 shows the type of valve used.

The requirement that the engines and the fuel-oil pumps should stop automatically after a certain lapse of time in case radio control failed was accomplished by the introduction of a "time limit clock" in the "stop valve" circuit. After the lapse of time for which it had been set, the clock opened this circuit, and the steam valves to the oil pumps and the engine throttles closed in the manner previously described.

The low-water alarm was of the usual type except that, instead of blowing a whistle, the steam was used to operate a piston that opened the "stop valve" circuit.

The principal radio-control apparatus is covered by patents of John Hays Hammond, Jr., who permitted the free use of it for this test. It was constructed by the General Electric Company under the supervision of Mr. Hammond and the Bureau of Engineering. Its success was pronounced from the start, but as with the first tests of all such apparatus, it was found that some of the parts were too sensitive, and more rugged ones were developed under the direction of the officers of the Battleship *Ohio*. Simplification of the equipment was also effected in the same manner.—*Mechanical Engineering*, January, 1922.

RADIO IN THE FUTURE.—Few people realize the future of radio in all aviation activities. The block signal system which has been developed at so much expense of time and money for the railroads, has no counterpart in the air.

Wireless apparatus will have to take care of all this work in addition to ordinary commercial telephone communication from plane to ground and vice versa. That is to say, a plane in commercial use will be using its wireless apparatus practically all the time when commercial air transportation is fully established. At the present development of the art, this is nearly impossible due to the interference brought into play. Some new invention or development is clearly required in this connection.

Two methods immediately suggest themselves. One would be some form of multiplex apparatus, and the other, directed messages. The first is self explanatory. By the second we mean that the messages being sent out along a certain airway would be directed along that airway and hence would not interfere with other traffic. The method of restricting wave lengths for certain classes of work has nearly reached its limit of usefulness today.

It is hoped that this problem will be solved before the situation becomes really acute.—*Aviation*, 23 January, 1922.

WIRELESS TELEGRAPHY IN SWEDEN.—The first Swedish wireless telegraph station for navigation was officially opened at Vinga, off Gothenburg, on November 15, states H. M. Minister at Stockholm, who adds that three other similar stations are being planned. The wireless station is intended to facilitate the navigation of vessels calling at the pilot station off Gothenburg, and of all vessels in the Skagerack passing Skagen. It has a radius of over 100 nautical miles. The wireless reports from Vinga will be transmitted free of charge for the present. The Swedish Government has recently approved proposals made by the Swedish Pilotage Board for co-operation between countries on the North Sea and the Baltic in regard to ice signalling by wireless. According to press reports in Sweden, the proposals to which effect was to be given at the close of

November, comprise a scheme for reports covering the entire Swedish coast from Haparanda to the Norwegian frontier. These wireless reports regarding the condition of the ice were to be issued daily in cypher, the key to which is being published in the Swedish Notices to Mariners. The wireless messages are also to include information regarding wrecks, the withdrawal of lightships, and with regard to the presence of obstacles to navigation.—*Engineering*, 23 December, 1922.

LONG DISTANCE WIRELESS IS STILL UNEXPLAINED.—In a lecture on the coming of age of long distance wireless telegraphy delivered at the Royal Society of Arts, Professor J. A. Fleming said that the length of waves mostly used for long-distance radio work is between six and twelve miles. Many eminent mathematicians have proven, however, during the last twenty years, that the signals received at distances of 6,000 to 12,000 miles are millions of times stronger than can be accounted for by pure diffraction or bending of the waves round the earth.

It is now generally agreed that long distance wireless telegraphy is only made possible by the existence of an electrical conducting layer in the earth's atmosphere at a height probably of from 100 to 200 kilometers. The presence of this highly conductive layer in the upper regions of the atmosphere, the component gases of which are hydrogen and helium, is probably due to electrified dust which comes to us from the sun being powerfully repelled against the attraction of gravitation by the pressure due to waves of light. This dust comes from the sun with enormous velocity and enters the higher levels of the atmosphere thereby rendering the same an electric conductor. The conducting layer guides the radio waves round the earth and prevents them escaping into space. No satisfactory explanation can yet be given as to the nature of the waves used in wireless telegraphy.—*Nautical Gazette*, 7 January, 1922.

ORDNANCE

ARMOR PIERCING TESTS.—During the past month tests have been conducted by the Ordnance Department at the Aberdeen Proving Ground, Md., of new types of .30 caliber armor piercing ammunition. Three types of bullets were tested, two of which have been in use for several years, namely, the .30 caliber armor piercing ammunition, Model of 1917, and the standard ammunition for testing light armor plate. The third type is a rather long bullet with hardened steel core, having a sharp ogive conforming in general to the ogive of the Service ammunition. While this bullet showed some remarkable features, it was found that the long point was not entirely satisfactory. In consequence of this it is expected that development will be continued and that eventually a new type of armor piercing ammunition will be evolved which will be superior to anything that has heretofore been available.—*Army and Navy Journal*, 24 December, 1921.

MISCELLANEOUS

SHIPBUILDING IN MINOR NAVIES.—Italian yards have been working on the balance of the war programme, which includes three "scouts," of 2200 tons, fourteen destroyers of 800 to 900 tons, and seven gunboats. In February last a new naval bill was introduced and passed, providing for the construction of two light cruisers, each of 5000 tons; four 900-ton destroyers, four 600-ton submarines, eight small minelayers and supply ships, an oil tanker of 7000 tons, and several armed motor launches. So far as is known, all these vessels are still in the designing stage. The battleship *Leonardo da Vinci*, whose salvage last year constituted one of the most remarkable engineering feats of its kind ever achieved, is not

to be reconditioned as a warship. There is some talk of converting her into an oil tanker.

The Spanish battleship *Jaime I.*, which was laid down as long ago as 1912, ran her steam trials last May. Except for the armament, the vessel was completed and her machinery tested in May, 1915, but owing to the war it was impossible to secure delivery of the heavy guns and mountings from the manufacturers—Vickers Limited and Sir W. G. Armstrong, Whitworth and Co., Limited. The two sister ships, *España* and *Alfonso XIII.*, have been in service six years. All three vessels are uniform in dimensions, etc., displacing 15,452 tons; maximum speed, 19½ knots; main armament, eight 12-in. 50-calibre guns. The whole of the machinery was manufactured at the Ferrol works of La Sociedad Española de Construccion Naval, where the ships were build. The steam trails of the *Jaime I.*, were very satisfactory, a mean speed of 20,028 knots being obtained in four runs over the measured mile. Work is proceeding at the Ferrol yard on two light cruisers—one said to be named *Almirante Cervera*—of 4725 tons and 29 knots speed, while the Cartagena yard has in hand three large destroyers and six submarines.

A naval programme for the defence of the Homeland and the Colonies was introduced by the Netherlands Government last November. It is limited to destroyers, submarines and aircraft, and, in view of the financial position, is to be spread over a period of six years. The light cruiser *Sumatra* was launched at Amsterdam on the penultimate day of 1920, but her sister ship, the *Java*, is still on the stocks at Flushing. The *Celebes*, a third vessel of this type, has been cancelled. The *Sumatra* and *Java* are vessels of 7050 tons, 30 knots speed and an armament of ten 5.9 in. Krupp guns. A number of submarines are in hand. In January last it was reported from Berlin that the Netherlands Government had placed an order with the German firm of Thiess for eighteen submarine engines, six of 450 horse-power and twelve of 1200 horse-power, the boats for which were to be built in Dutch yards.

There is scarcely any new construction in progress for the Scandinavian navies. Sweden has completed the *Gustav V.*, third of the *Sverige* class of small coast-defence battleships; Norway is building two submarines, and has ordered two more from the United States; and Denmark has decided to transform the uncompleted monitor, *Niels Juel*, into a cruiser, with a quick-firing armament. This vessel was to have carried two 12-in. guns.

Various naval projects are under consideration in the South American States, but nothing definite has emerged up to now. It is to be apprehended that the clause in the Washington agreement which forbids the signatory Powers to sell existing warships to other States or construct new vessels for foreign account will not only hamper the development of minor navies, but deprive British shipbuilders of a class of business which has proved lucrative to them and highly satisfactory to their foreign customers.—*The Engineer*, 13 January, 1922.

EFFECT OF GOVERNMENT SUBSIDIES.—Italy furnishes a proof of how subsidies retard the rejuvenation of a nation's merchant marine. As a rule ships 20 years afloat are considered to have about outlived their usefulness and certain authorities have even urged the destruction of all liner tonnage reaching this age. Yet in the case of the 85 vessels subsidized by the Italian Government to the amount of 100,000,000 lire, the average age is 27 years. Only 27 of these ships are 20 years old or less, while 25 have been in service for more than 30 years. Eight steamers have passed the half century mark, the 3 oldest having each survived the storms of 59 wintry seas. Had they not been the recipient of Government

doles, it is safe to say that these veteran craft would have long since been replaced by vessels of a modern type.—*Nautical Gazette*, 21 January, 1922.

THE YANGTSE PATROL.—A very interesting report has appeared in the Japanese papers apropos the policing of the Yangtse. It is to the effect that, in view of the disturbed state of things prevailing along the river, the Powers whose interests are at stake have agreed upon conjoint measures to be taken for their protection. It has therefore been decided that a combined flotilla shall be organized, consisting of four British, six Japanese, four American, and two French warships. This force will be placed under the supreme command of Vice-Admiral Sir A. L. Duff, of the British China squadron, with Vice-Admiral Yoshida, commanding the Japanese squadron in Chinese waters, as second in command. The sphere of its activity will be the area covering Shanghai, Hankow, and Ichang. In accordance with this programme many warships of different nationalities were gathering at Shanghai when the despatch was sent. The details of organization and the allotment of special areas of protection were to be fixed on the arrival of all the ships participating.

The journal, *Asahi*, quotes a Japanese naval authority as saying that the scheme was first mooted by the British Minister at a conference of diplomats, which was called during the attack on Ichang by the Sechuzan troops some time ago. The idea is considered difficult to operate in practice. Nevertheless, the situation along the Yangtse has become very grave, and it is not surprising that the scheme should be revived at this juncture. Indeed, a similar proposal was put forward at the time of the first Chinese revolution. There are now fifteen British gunboats in China, most of them grouped under Rear Admiral C. Maclachlan, as senior naval officer, Yangtse, with his flag in the Bee. It would seem therefore, that the above report is erroneous in naming the British contribution to the proposed international flotilla as four ships only, since all, or nearly all, our gunboats in China would probably join the force.—*Naval and Military Record*, 28 December, 1921.

PETROGRAD PORT CONDITIONS.—A Hamburg correspondent writes that a Norwegian captain, who has just returned from Petrograd, gives an interesting account of the chaotic conditions prevailing at that port and of the difficulty encountered in getting vessels unloaded. In the case of his particular ship, the discharging of cargo was begun on a Saturday. As the following Monday was a holiday no work was done on that day. On Tuesday a heavy snowstorm prevented the ship frm being unloaded. On Wednesday one gang of laborers worked for one hour only.

After that better progress was made, but there was a continual shortage of workers, some of whom had to come great distances in order to reach their place of work. Winter had set in early and the cold hindered the work of unloading considerably. Both men and women workers were employed, who received no money for their labor but were given a certain amount of bread instead. They were thus without any incentive to speed up their labors. At the end of every hour work was halted for a short time, which period was called "smoking time." The laborers worked from 10 A. M. to 3 P. M. which five hours constituted a full day's work.

The entire harbor district is patrolled and watched by armed guards who allow no one exept the workers admittance. On going ashore these as well as members of the crew are carefully searched. The seat of the Soviet Administration office is in a large building just outside the harbor district. It contains a large number of offices and some 300 clerks are employed therein. The utmost disorder prevailed everywhere and the

establishment was without any efficient head, for it is a rule of the Soviet Government that everything must be run by a commission instead of by a single individual. All of the rooms are unheated, poorly supplied with water facilities and badly lighted.

The captains of the ships which happened to be in port had to call every day at this administration building and to make a formal request for the unloading of their ships. Profuse promises were always forthcoming that the cargoes would be promptly unloaded, but little was done to make these promises effective. In one case a ship had been twenty-six days in port without its cargo having been touched.—*Nautical Gazette*, 7 January, 1922.

CURRENT NAVAL AND PROFESSIONAL PAPERS

Functions of the Submarine. *Naval and Military Record*, 18 January, 1922.

Design and Construction of U. S. Passenger Steamers. *Engineering*, 23 December, 1921.

Proportioning of Steam Turbine Blading. *Engineering*, 13 January, 1922.

Compounding the Combustion Engine. *Mechanical Engineering*, January, 1922.

The Machinery of Floating Docks. *The Shipbuilder*, January, 1922.

Printing Telegraph by Radio. *Journal of Franklin Institute*, January, 1922.

NOTES ON INTERNATIONAL AFFAIRS

FROM JANUARY 5 TO FEBRUARY 5

PREPARED BY

ALLAN WESTCOTT, Professor, U. S. Naval Academy

NAVAL AGREEMENTS

FIVE-POWER NAVAL TREATY.—In addition to the Four-Power Pacific Treaty, which was signed on December 13, the Washington Conference in plenary session on February 1 adopted the Five-Power Naval Treaty, fixing the ratio and amount of capital ship tonnage for the United States, Great Britain, Japan, France, and Italy for the next ten years; limiting the tonnage of aircraft carriers; specifying that cruisers shall not exceed 10,000 tons or carry above 8-inch guns; and limiting the construction of naval bases in the Pacific. Article XIX regarding Pacific fortifications, the only matter that remained unsettled during the final month of the Conference, was finally determined by listing the islands and territories to which the *status quo* should apply, the United States agreeing not to fortify the Aleutian Islands, and Japan making the same agreement for Formosa, the Pescadores, and other of her island possessions, as follows:

Article XIX:

The United States of America, the British Empire, and Japan agree that the *status quo* at the time of the signing of the present treaty, with regard to fortifications and naval bases, shall be maintained in their respective territories and possessions specified hereunder:

(1) The insular possessions which the United States now holds or may hereafter acquire in the Pacific Ocean, except (a) those adjacent to the coast of the United States, Alaska, and the Panama canal zone, not including the Aleutian Islands, and (b) the Hawaiian Islands.

(2) Hongong and the insular possessions which the British Empire now holds or may hereafter acquire in the Pacific Ocean, east of the meridian of 110 degrees east longitude, except (a) those adjacent to the coast of Canada, (b) the Commonwealth of Australia and its territories, and (c) New Zealand.

(3) The following insular territories and possessions of Japan in the Pacific Ocean, to wit: the Kurile Islands, the Bonin Islands, Amami-Oshima, the Loochoo Islands, Formosa and the Pescadores, and any insular territories or possession in the Pacific Ocean which Japan may hereafter acquire.

The maintenance of the *status quo* under the foregoing provisions implies that no new fortifications or naval bases shall be established in territories and possessions specified; that no measures shall be taken to increase the existing naval facilities for the repair and maintenance of naval forces, and that no increase shall be made in the coast defenses of the territories and possessions above specified. The restriction, how-

ever, does not preclude such repair and replacement of worn-out weapons and equipment as is customary in naval and military establishments in time of peace.

SUBMARINE AND GAS AGREEMENT.—To the Five-Power Treaty, adopted on February 1, binding the signatories to refrain from the use of submarines as commerce destroyers (for text see Notes in February issue), the following clause was added binding the signatories to refrain from use of poisonous gases in war between themselves:

The use in war of asphyxiating, poisonous or other gases, and all analogous liquids, materials or devices having justly been condemned by the public opinion of the civilized world and a prohibition of such use having been declared in treaties to which a majority of the civilized powers are parties, the signatory powers, to the end that this prohibition shall be universally accepted as a part of international law binding alike the conscience and practice of nations, declare their assent to such prohibition, agree to be bound thereby as between themselves, and invite all other civilized nations to adhere thereto.

JAPANESE HOMELAND EXCLUDED.—By a resolution adopted February 4 the Japanese homeland was excluded from the Japanese "insular possessions" protected by the Four-Power Pacific Treaty. This was done at the instance of the Japanese Government following the misunderstanding of this phrase as it occurred in the original treaty.

FAR EASTERN AGREEMENTS

AGREEMENTS RELATING TO CHINA.—Of the two treaties relating to China adopted at Washington on February 4, one dealt exclusively with the Chinese Tariff and provided for its increase to an effective 5% within four months, with provision for further increases and revision every four years.

The other and more important treaty included the four principles proposed by Elihu Root and the reaffirmation of the "open door," the first four of the nine articles reading as follows:

Article 1.—The contracting powers, other than China, agree:

1. To respect the sovereignty, the independence, and the territorial and administrative integrity of China.
2. To provide the fullest and most unembarrassed opportunity to China to develop and maintain for herself an effective and stable Government.
3. To use their influence for the purpose of effectually establishing and maintaining the principle of equal opportunity for the commerce and industry of all nations throughout the territory of China.
4. To refrain from taking advantage of conditions in China in order to seek special rights or privileges which would abridge the rights of subjects or citizens of friendly States, and from countenancing action inimical to the security of such States.

Article 2.—The contracting powers agree not to enter into any treaty, agreement, arrangement, or understanding, either with one another, or, individually or collectively, with any power or powers, which would infringe or impair the principles stated in Article 1.

Article 3.—With a view to applying more effectually the principles of the open door or equality of opportunity in China for the trade and industry of all nations, the contracting powers, other than China, agree they will not seek, nor support their respective nations in seeking:

(A) Any arrangement which might purport to establish in favor of their interests any general superiority of rights with respect to commercial or economic development in any designated region in China;

(B) Any such monopoly or preference as would deprive the nationals of any other power of the right of undertaking any legitimate trade or industry in China, or of participating with the Chinese Government, or with any local authority, in any category of public enterprise, or which by reason of its scope, duration or geographical extent is calculated to frustrate the practical application of the principle of equal opportunity.

It is understood that the foregoing stipulations of this article are not to be so construed as to prohibit the acquisition of such properties or rights as may be necessary to the conduct of a particular commercial, industrial or financial undertaking or to the encouragement of invention and research.

China undertakes to be guided by the principles stated in the foregoing stipulations of this article in dealing with applications for economic rights and privileges from Governments and nationals of all foreign countries, whether parties to the present treaty or not.

Article 4.—The contracting powers agree not to support any agreements by their respective nationals with each other, designed to create spheres of influence or to provide for the enjoyment of mutually exclusive opportunities in designated parts of Chinese territory.

JAPAN SURRENDERS SHANTUNG.—The Shantung Treaty, signed in Washington by Japan and China on February 4, brought about a practically complete surrender of the province to China. Japan agreed to withdraw troops, police, and gendarmes from Shantung as soon as possible, to turn over all former German public buildings and property upon compensation for improvements, and to give over the German cable, wireless station, and salt industry (with the right of Japan to purchase a part of the product annually). Regarding the Shantung (Tsingtau-Tsinanfu) Railway, which constituted the chief stumbling block, the arrangement is that China shall pay 53,406,141 gold marks in Treasury bonds, having a fifteen-year limit, with the privilege to China of full or part payment at any time after five years. Prior to complete redemption there is to be a Japanese traffic manager, subject to a Chinese managing director. The other railways are to be international enterprises on terms fixed by China. One iron mine and two coal mines are to be operated under Chinese direction with Japanese capital not exceeding 50%.

FRANCE AND ENGLAND RETURN BASES.—At the plenary session of February 1 Mr. Balfour gave an official promise that Great Britain would restore Wei-hai-wei to China. M. Sarraut also stated that France would return Kwangchow-wan on the Chinese coast near French Indo-China.

TWENTY-ONE DEMANDS.—The statements of Japan, China, and the United States regarding Japan's "Twenty-one Demands" were recorded. Japan stated that the seven demands in Group V would be abandoned.

and made other concessions. Since Group I of the demands are already cancelled by the return of Shantung, the difficulties arising from the original demands are at least considerably reduced. At the same time Japan refuses consideration of the treaties and privileges secured in Manchuria and elsewhere when this ultimatum was originally presented to China.

JAPAN'S SIBERIAN PROMISE.—The statement of Baron Shidehara relating to Siberia was also recorded. This statement entered into an account of the circumstances under which Japanese troops entered Siberia, and ended with a promise to withdraw them, though without specifying the time. The latter part of his statement follows:

The Japanese Government are now seriously considering plans which would justify them in carrying out their decision of the complete withdrawal of Japanese troops from the maritime province, with reasonable precaution for the security of Japanese residents and of the Korean frontier regions. It is for this purpose that negotiations were opened some time ago at Dairen between the Japanese representative and the agents of the China Government.

Those negotiations at Dairen are in no way intended to secure for Japan any right or advantage of an exclusive nature. They have been solely actuated by a desire to adjust some of the more pressing questions with which Japan is confronted in relation to Siberia. They have essentially in view the conclusion of provisional commercial arrangements, the removal of the existing menace to the security of Japan and to the lives and property of Japanese residents in Eastern Siberia, the provision of guarantees for the freedom of lawful undertakings in that region, and the prohibition of Bolshevist propaganda over the Siberian border. Should adequate provisions be arranged on the line indicated the Japanese Government will at once proceed to the complete withdrawal of Japanese troops from the maritime province.

The occupation of certain points in the Russian province of Sakhalin is wholly different, both in nature and in origin, from the stationing of troops in the maritime province. History affords few instances similar to the incident of 1920 at Nikolaievsk, where more than 700 Japanese, including women and children, as well as the duly recognized Japanese Consul and his family and his official staff, were cruelly tortured and massacred. No nation worthy of respect will possibly remain forbearing under such a strain of provocation. Nor was it possible for the Japanese Government to disregard the just popular indignation arounsed in Japan by the incident. Under the actual condition of things, Japan found no alternative but to occupy, as a measure of reprisal, certain points in the Russian province of Sakhalin in which the outrage was committed pending the establishment in Russia of a responsible authority with whom she can communicate in order to obtain due satisfaction.

Nothing is further from the thought of the Japanese Government than to take advantage of the present helpless condition of Russia for prosecution of selfish designs. Japan recalls with deep gratitude and appreciation the brilliant rôle which Russia played in the interest of civilization during the earlier stage of the great war. The Japanese people have shown and will continue to show every sympathetic interest in the efforts of patriotic Russians as pointing to the unity and rehabilitation of their country. The military occupation of the Russian province of Sakhalin is only a temporary measure and will naturally come to an end as soon as a satisfactory settle-

ment of the question shall have been arranged with an orderly Russian Government.

In conclusion, the Japanese delegation is authorized to declare that it is the fixed and settled policy of Japan to respect the territorial integrity of Russia and to observe the principle of non-intervention in the internal affairs of the country, as well as the principle of equal opportunity for the commerce and industry of all nations in every part of the Russian possessions.

AGREEMENTS NOT IN TREATIES.—*Washington, Feb. 6 (Associated Press).*—As the agreements of the Conference finally shape up, nine of the resolutions, formally adopted, are left out of the series of treaties, delegation leaders explaining that they deal with subjects which relate to executive policy and do not require parliamentary ratification.

These resolutions, which are declared, nevertheless, to stand as binding agreements among the powers, provide for withdrawal of foreign post offices from China, establishment of a commission to investigate extra-territoriality in China, regulation of Chinese radio facilities, consideration of the question of withdrawing foreign troops from Chinese soil, unification of the Chinese railroads, publicity of all commitments affecting China, "better protection" for the Chinese Eastern Railway, a conference of the powers on rules of warfare, and a request on the part of the powers that China reduce her military forces.—*New York Times,* 7 February, 1922.

GREAT BRITAIN AND IRELAND

IRISH FREE STATE ESTABLISHED.—After prolonged and bitter debate the Irish Dail Eireann on the night of January 7 approved the Anglo-Irish Treaty by a vote of 64 to 57. De Valera thereupon resigned the presidency of the Irish Republic, and a motion to accomplish his re-election was defeated (60 to 58). The House of Commons for Southern Ireland, summoned for the purpose, ratified the treaty unanimously (De Valera's followers absent) on January 14, and a provisional government was set up. Arthur Griffith as president of the Dail Eireann did not actually enter this government, which was headed by Michael Collins as Minister of Finance. Until general elections are held the Dail Eireann still controls the country, the provisional government functioning by its consent to execute the treaty. The provisional government took control on January 16.

NEGOTIATIONS WITH ULSTER.—At a conference in London on January 20 the Ulster premier, Sir James Craig, and Michael Collins reached an agreement by which (1) the boundary question was to be negotiated by one representative each from Ulster and the Free State, without a third British member; (2) the Belfast boycott against Catholic workmen was to be discontinued; (3) united efforts were to be made to settle the railroad dispute. A subsequent meeting of the heads of the two governments at Dublin on February 2 revealed fundamental difficulties over the boundary question, the Ulster premier declaring that there could be no question of a large transfer of territory to the Free State, whereas Collins insisted that this had been promised by Premier Lloyd George. The stiff attitude of the southern leader was attributed in part to his need of re-

taining a majority of the Dail Eireann, representatives of which were to meet on February 28.

BRITISH OFFERS TO EGYPT.—It was announced on January 29 that Lord Allenby, British High Commissioner in Egypt, had been requested to return to London for consultation on the Egyptian situation. The British government reiterated its willingness to recognize the sovereignty of Egypt and the re-establishment of an Egyptian parliament and foreign ministry, on the following conditions:

> They must have full and effective guarantees, first, that the imperial communications, to which Egypt is essential, are assured; second, that Great Britain retain both the right and power to afford that protection to the foreign communities in Egypt which the Governments of these peoples in the existing conditions look to her to supply; and, third, that Egypt is safeguarded against all foreign interference or aggression, direct or indirect.

WAR SETTLEMENT PROBLEMS

SUPREME COUNCIL AT CANNES.—A conference of the British, French, and Italian premiers, with representatives of other nations, and Ambassador Harvey present in an advisory capacity for the United States, met at Cannes on January 6. The chief accomplishment of the conference was an agreement to issue a general invitation to all European nations and the United States to attend a conference for the economic reconstruction of Central and Eastern Europe. The subsequent fall of the Briand Ministry brought the Conference to an end on January 12.

GERMAN REPARATIONS PROPOSALS.—At the Cannes Conference it was tentatively agreed that German cash payments this year should be reduced from the 2,000,000,000 gold marks due to 750,000,000, and that there should be payments in kind amounting to 1,450,000,000 gold marks. When the Conference broke up without final action, the Reparations Commission called upon Germany to pay 31,000,000 marks every ten days pending a final settleemnt, and at the same time present a definite plan for financial reforms.

The German reply on January 27 made various statements and proposals which may be summarized as follows: (1) Reforms made or to be made, including increased postal and rail rates, a new banking law separating the Reichs bank from government control, check on paper money issues, reduction of expenses, so that the internal budget had been balanced while leaving nothing for reparations payments. (2) Taxation proposals, including a 1,000,000,000 gold mark compulsory loan to fall upon the capitalistic classes, details not arranged, but to bear no interest for three years and only a small rate thereafter. (3) Reduction of cash payments this year below the 720,000,000 gold marks demanded, with opportunity to increase payments in kind. (4) Appeal for restoration of the European economic system, enabling Germany to float a great international reparations loan.

This reply was not acted upon by the Reparations Commission but was transmitted to the Allied Governments.

FIRST SESSION OF LEAGUE WORLD COURT.—The first preliminary sitting of the Permanent International Court of Justice established by the League of Nations was held at the Peace Palace in The Hague on January 30. Dr. B. T. C. Loder of Holland took the chair and was afterward elected permanent president of the court for a term of three years. His salary is 15,000 florins with 40,000 allowances, and that of the other judges 15,000 with 20,000 allowances. The first public meeting of the court was scheduled for February 15, although there were no cases on the calendar. Eighteen nations have accepted compulsory jurisdiction of the court in disputes with other nations, and the court has also been given jurisdiction by the league over disputes relating to international labor and transit agreements, certain African treaties, and agreements regarding protection of minorities. The court meets at least once a year about June 15.

FRANCE

POINCARÉ SUCCEEDS BRIAND.—After securing at Cannes certain modifications in the proposed Anglo-French Treaty, Premier Briand returned to Paris on January 12 to face the increasing opposition to his policies in the French Chamber. In spite of the fact that he rallied a majority of the deputies to his support, and without waiting for a vote, M. Briand with his cabinet then resigned. His resignation was attributed to his feeling that he could not continue foreign negotiations while constantly hampered and criticized in parliament.

Former President Poincaré, leader of the opposition, was asked to form a new cabinet, and on January 15 presented a slate composed almost entirely of members of the Right or Nationalist party. Of the thirteen members, five, including M. Sarraut, Minister of Colonies and then in Washington, had served under Briand. Indications were that the new premier would continue his predecessor's policies, the change being chiefly toward a stiffer attitude in maintenance of French interests. To this end, M. Poincaré expressed his intention to give up the Supreme Council, where France was often in a minority, as a means of settling international policies, and return to negotiations through ambassadors and the ordinary diplomatic channels.

GENOA CONFERENCE

CALL FOR GENOA CONFERENCE.—On January 6 was issued the text of the Supreme Council resolution calling for a general economic conference of all European states, including Germany, Austria, Hungary, and Russia. The purpose was stated to be a common effort of the great powers for the rehabiliation of the European economic system and restoration of normal production and commerce. The announcement read in part:

> The allied powers consider that the fundamental and indispensable conditions for the realization of an efficacious effort are capable of being defined in general terms as follows:
>
> (1) The nations cannot claim the right to dictate to each other the principles according to which they must organize within their frontiers,

their régime of property, their economy and their government. It is the right of each country to choose for itself the system which it prefers.

(2) Nevertheless it is not possible to place foreign capital in order to help a country unless the foreigners who provide the capital have a certitude that their property and their rights will be respected and that the fruits of their enterprise will be assured.

(3) This feeling of security cannot be re-established unless nations or their Governments desiring to obtain foreign credits freely engage: (a) To recognize all public debts and obligations which have been contracted, or will be contracted or guaranteed by States, municipalities, or other public organizations, and to recognize also obligation to restore or, in case of default, to indemnify all foreign interests for loss or damage which has been caused by the confiscation or sequestration of property; (b) to establish legal and juristic punishment and assure the impartial execution of all commercial or other contracts.

(4) The nations ought to have available convenient means of exhange; in general, financial and monetary conditions ought to exist which offer sufficient guarantees.

(5) All nations ought to engage to abstain from all propaganda which is subversive of the political system established in other countries.

(6) All nations ought to take a common engagement to abstain from all aggression on their neighbors.

If with a view to assuring the necessary conditions for the development of the commerce of Russia the Russian Government claims official recognition, the allied Governments cannot accord this recognition unless the Russian Government accepts the preceding conditions.

AGENDA OF CONFERENCE.—*Paris, Jan. 19 (Associated Press).*—The program of the coming economic conference to be held in Genoa was officially made public tonight. The questions to be discussed will be:

(1) Examination into means for putting into execution the principles contained in the Cannes resolution of January 5, 1922.

(2) Establishment of European peace upon a solid basis.

(3) Conditions necessary to the restoration of economic confidence without endangering or altering existing treaties.

(4) Financial questions, such as currency, paper money, banks and banking systems.

(5) Economic and financial questions.

ACCEPTANCE OF CONFERENCE INVITATIONS.—The invitations to the Genoa Conference were at once accepted by all the European powers. From Moscow it was announced that Lenin would attend in person, with a large following. The United States delayed in replying, but it was considered certain that this country would decline to take an active part. Premier Poincaré indicated the continued willingness of France to participate, but only on condition that the scope of discussions should be strictly limited and defined beforehand. In view of this attitude, and various changes of ministries, a postponement or abandonment of the Conference appeared certain.

PROJECTED ANGLO-FRENCH ALLIANCE

BRITISH PROPOSALS.—The British Memorandum for an Anglo-French treaty as presented on January 11 began with a statement of the need of assuring France against German aggressions and then laid down what were

practically the conditions essential to a treaty: (1) That England did not intend to be involved in military enterprises in Central and Eastern Europe; (2) That naval competition between France and England must be avoided, by conference or naval programs; (3) That agreement must be reached on a policy for restoring peace in the Near East. The treaty proposals followed:

Article I.—In case of direct and unprovoked aggression against the territory of France by Germany, Great Britain will place herself immediately at the side of France with her naval, military and aerial forces.

Article II.—The high contracting parties again affirm the common interest which Articles 42, 43 and 44 of the Treaty of Versailles have for them, and they will act in concert if there arises any menace of violation to any one of said articles, or if any doubt arises as to their interpretation.

Article III.—The high contracting parties also undertake to act in concert in case of Germany taking any military, naval or aerial measures whatever incompatible with the Treaty of Versailles.

Article IV.—The present treaty imposes no obligation whatsoever on any dominions of the British Empire, unless or until approved by the dominion which is interested.

Article V.—The present treaty will remain in vigor for a period of ten years, and will, by common accord, be renewable at the end of that period.

FRENCH COUNTER-PROPOSALS.—The Poincaré government, taking up the Anglo-French treaty negotiations, proposed (1) a duration of twenty-five years instead of ten; (2) specific mention of reciprocal aid, France promising assistance to England; (3) extension of "German aggression" to include violations in the neutral zone; (3) immediate discussions in case of menace to Poland; (4) making the treaty a definite military instrument by provision for co-operation on the part of the army and navy general staffs of the two nations.

To these proposals the British reply was in general unfavorable on the ground that Great Britain did not wish to enter upon a military combination to control Europe. Furthermore, agreement upon a Near Eastern policy was insisted upon.

ALLIED PROBLEMS IN NEAR EAST.—At the Cannes Conference French opposition to Briand was aroused by fear that he would throw over French ambitions in the Near East as the price of accord with England. A conference of British, French and Italian foreign ministers on the Near East set for February 1 in Paris was indefinitely postponed owing to the contents of a French Memorandum to Great Britain on the subject.

There was general agreement that the Treaty of Sévres must be abandoned. The British proposed to prevent renewal of Greek-Turkish hostilities in the spring by a settlement on lines as follows: (1) evacuation of Smyrna by Greeks; (2) local autonomy for zone under Turkish control; (3) safeguards for Christian minorities; (4) Rodosto-Midia line as Turco-European frontier. The contents of the French Memorandum were not revealed, but presumably expressed the unwillingness of France to give up a policy favorable to Turkey, on the ground that Greek occupa-

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tion of Western Asia Minor meant British predominance, and that internationalization of the Dardanelles meant British naval control. On these accounts France was reluctant to abandon the Angora Treaty with the young Turks.

SOUTHERN AND EASTERN EUROPE

FALL OF AUSTRIAN MINISTRY.—The Schober Ministry in Austria resigned on January 26. Although the ministry had been supported by the Pan-German party, this party was responsible for its fall, owing to opposition to the economic treaty with Tzechoslovakia. The treaty was ratified, however, and should tend ultimately to improve Austria's economic situation. Austrian finances stood in dire need of an international loan, held up until the passage of the Foreign Debts Bill in the U. S. Senate would enable the U. S. Government to waive its claim on Austrian resources.

ELECTION OF POPE.—Pope Benedict XV died on January 22, after holding the papal chair since September of 1914. On February 3 the College of Cardinals went into secret conclave for the election of a successor, the choice finally being Cardinal Ratti.

ITALIAN CABINET OVERTHROWN.—The Bonomi Cabinet in Italy resigned on February 2, after losing the support of 150 votes of the Democratic party. The Ministry had been strongly opposed by Fascisti and Nationalists.

UNITED STATES

BULGARIAN TREATY.—On February 3 the Bulgarian Cabinet approved a treaty of amity and commerce with the United States. The treaty is intended to protect American interests in view of Allied reparations claims, and follows the general lines of the German and Austrian peace treaties, save that in the case of Bulgaria there was no declaration of war.

FOREIGN DEBTS BILL PASSED.—On January 31 the Senate by a vote of 39 to 29 passed the bill to refund the $11,000,000,000 foreign debts into securities maturing in not more than twenty-five years, to bear interest at not less than four and one-half per cent. Control is put in the hands of a commission of five, probably consisting of three cabinet members and representatives of the House and Senate, for a term of not more than three years. The Senate amendments were approved by the House and the bill was sent to the President, who signed it in spite of objections to the limitations on time and rate of interest.

ARBITRATION OF CHILI-PERU DISPUTE.—On January 20 it was announced that both Chili and Peru had accepted invitations of President Harding to send delegates to Washington to discuss means of settling their long-standing dispute over the coast provinces of Tacna and Arica. Chili's proposals for a plebiscite were unacceptable to Peru, who, desired a revision of the whole Treaty of Ancor.